

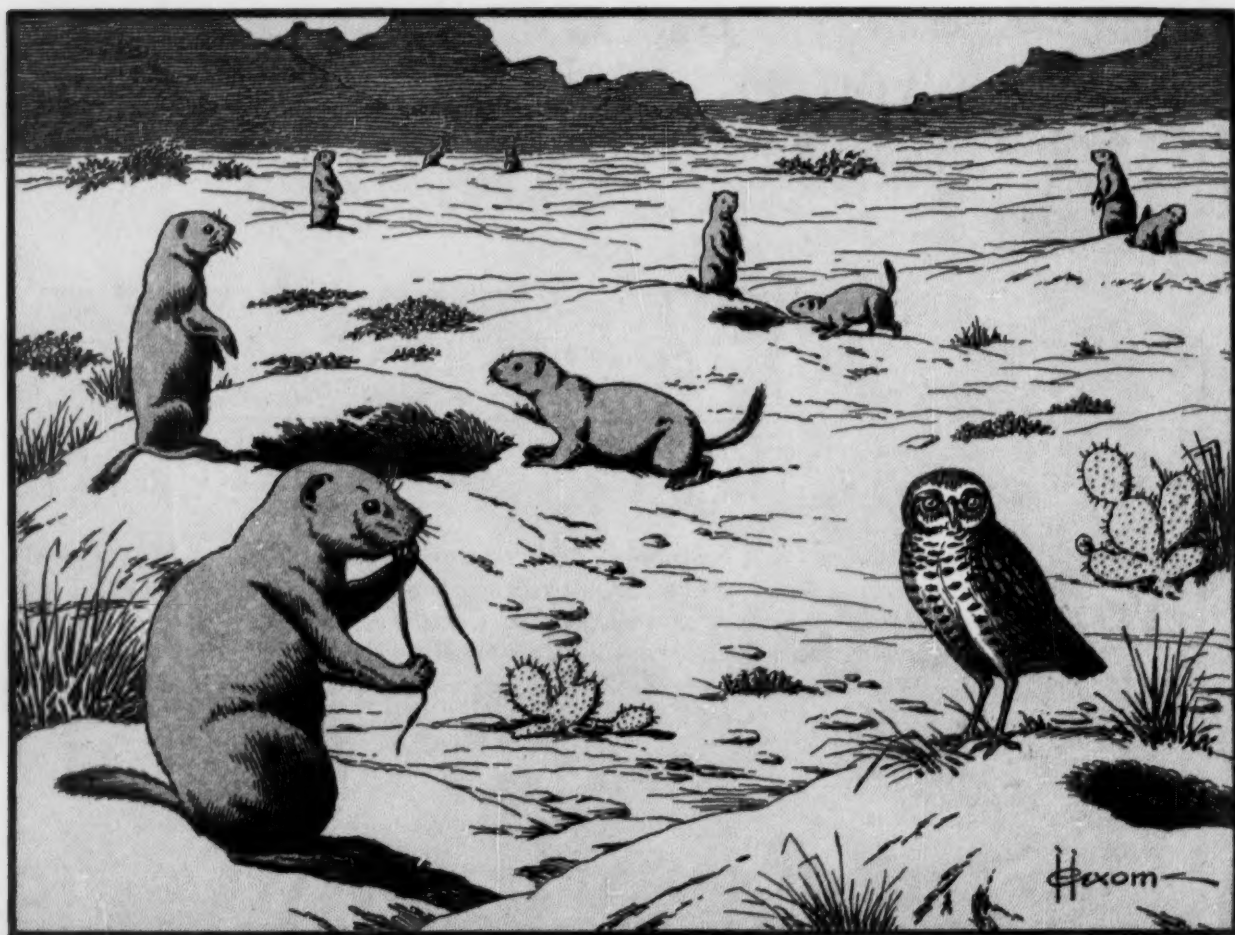
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AUGUST-SEPTEMBER

1957

VOLUME 50 NUMBER 7

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Reviews

Wild Ocean

By Alan Villiers. New York. 1957. McGraw-Hill Book Company. 326 pages. Illustrated. \$5.00.

As this is written *Mayflower II* is reported some 500 miles off Bermuda. Before this sees print the little ship should be safely docked in Plymouth by its skipper, who is the author of this interesting book. He has told the story of the North Atlantic and the men who, through the years, have sailed its turbulent surface and navigated the leagues of this wild ocean. The author goes back to the early adventurers who set out on unknown seas and brings the reader down through the days of packets and clipper ships to the Atlantic of two wars, its conquest in the air, and as it is today. This is a timely volume at a moment when thousands cross the Atlantic in great liners of the air and read about the 1957 crossing of a little sailing ship in the image of a noted ancestor.

Owyhee

By Earl J. Larrison. Caldwell, Idaho. 1957. The Caxton Printers. 357 pages. Illustrated by Don Fritts. \$5.00.

One does not think of the State of Idaho in terms of desert, but such a country is to be found in Owyhee County, which occupies the extreme southwestern corner of the "Potato State." The author of this book, mammalogist, animal ecologist and assistant professor of zoology at the University of Idaho, has visited this desert extensively during the past five years, primarily to study its wildlife. The result is a fascinating story of a region that has climates ranging from 35 degrees below zero to 120 degrees above, and the animal life that has adapted to such extremes.

Nature and Garden Fun

By Ernestine Sabrina Coffey and Dorothy Fitch Minton. New York. 1957. Hearthside Press. *Leader's Guide*, 127 pages, \$2.75. *Book for Juniors*, 63 pages, \$1.75.

Here are two books that open wide doors to Nature knowledge and experience. They appear under the same main title, with one book, for the use of juniors, containing practical instructions on making inexpensive garden gifts, bird houses, bird feeders, decorations and a variety of other things from Nature and the garden. The second book is

written for use by teachers, parents, librarians and club leaders who may be faced with teaching horticulture, conservation, flower-arranging, bird lore and other facets of a Nature and garden program for young people. Both authors are teachers, mothers and experienced in working with youngsters, so they have the advantage of having proved the practicality of the excellent material presented in each of these books.

Using Wayside Plants

By Nelson Coon. Box 287, Watertown 72, Mass. 1957. Published by the author. 254 pages. Illustrated. \$3.00.

In this book the author describes one hundred edible and useful plants that may be found along the waysides of the northeastern part of the United States. In connection with each he provides recipes for their use, if their particular value is in their edibility, and instructions for their use if they have other values, whether decorative or practical. He has chosen a rather wide range of both plants and uses, some for food, some for crafts, others for their value medicinally or as dyes, others that may offer possibilities for enhancement of the landscape, or for decorative effects in the home. The author is the librarian at the famed 125-year-old Perkins School for the Blind, on the banks of the Charles River in Watertown, Massachusetts, and a writer on gardening. R.W.W.

Biology

By Elsbeth Kroeber, Walter H. Wolff and Richard L. Weaver. Boston. 1957. D. C. Heath and Company. 608 pages. Illustrated.

When a new biology textbook is added to the present considerable library of biology textbooks one first seeks the justification for this newcomer. There appear to be several excellent reasons for this new text. Not the least of these is the physical appearance of the book, which, by its typography and illustration, effectively suggests the dramatic experience that is to be found in the study of biology. Further exploration of the book reveals several points of emphasis that set it apart from other texts. These include an excellent unit on conservation, today an essential part of the approach to biology. There is a special section devoted to field trips and the benefits to be derived from biology study by actual contact and field observation. Emphasis on human biology is notable in this textbook, also. The au-

thors have ably organized their text and made it easy to read and use, and they have supplemented it with well-chosen illustration and effective use of color. Each chapter provides interesting suggestions for "do it yourself" biological experiences, and there are well-selected references valuable for supplementary reading and for identification. Such a book is a far cry from the biology textbooks of not so long ago and which, in our experience, discouraged rather than lured the student. R.W.W.

Glacial and Pleistocene Geology

By Richard Foster Flint. New York. 1957. John Wiley and Sons, Inc. 554 pages, with 5 end-plates. Illustrated. \$12.50.

The past few years have seen great forward strides in the interpretation of the substance and effects of the great ice sheets that periodically flowed and ebbed across large areas of the world, during the geologically recent Pleistocene epoch, or time-interval. Students of glaciology now have at their command some potent new tools—radioactive carbon dating, for example—with which to probe the secrets of the Pleistocene ice and its relics. The results obtained from new methods, and the new theories stemming from them, are incorporated in this volume by a respected authority in the field of glaciation. This work deals particularly with the Pleistocene glaciation in North America, its rearranging of the physical face of the countryside, its forced changes in distribution of mammal and plant life, and the origin, movement and effects generally of the ice masses we call glaciers. P.M.T.

The Tropics

By Edgar Aubert de la Rue, Francois Bourlière, and Jean Paul Harroy. New York. 1957. Alfred A. Knopf. 298 pages. Illustrated in color and black and white. \$12.50.

Here is a truly beautiful book and a happy collaboration of authorities on the tropics. M. de la Rue writes the first sections on the tropical environment and the plant landscape of this region. M. Bourlière authors the section on the animal life of the tropics, and M. Harroy, former secretary general of the International Union for Conservation, covers man and the tropical environment. The illustrations, printed in France, are gorgeously reproduced.

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Published by the **AMERICAN NATURE ASSOCIATION** to stimulate public interest in every phase of nature and the out-of-doors, and devoted to the practical conservation of the great natural resources of America

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Nature Magazine, past and present, is indexed in *The Reader's Guide* in your public library.

Reviews

Mammals of the Great Lakes Region

By William H. Burt. Ann Arbor, Michigan. 1957. University of Michigan Press. 246 pages. Illustrated with distribution maps. \$4.75.

In this book it is the author's primary purpose to bring up to date present knowledge of the habits, life histories, economic importance and distribution of the mammals of the Great Lakes Region. He has a second purpose and that is to stimulate further research with respect to mammals of this area. Dr. Burt is professor of zoology and curator of mammals at the University of Michigan and past president of the American Society of Mammalogists. Introductory chapters deal generally with the faunal position of the Great Lakes area; trace changes in mammalian fauna; consider the economic importance of mammals, their home ranges, territories and populations. The mammals themselves are then presented, in many cases with distribution maps. There is a brief consideration of specimen preparation, and keys and other technical identification data are provided. This is an important and most useful addition to the mammal library.

Workbook for Field Biology and Ecology

By Allen H. Benton and William E. Werner, Jr. Minneapolis. 1956-1957. Burgess Publishing Co. 268 pages. Spiral-bound.

The authors of this workbook seek to give the beginner in field biology a background in several areas, and to suggest sources for further information. This workbook is designed to accompany *Principles of Field Biology and Ecology* by the same authors, published by the McGraw-Hill Book Company, New York.

Briefly Noted

Galactic Nebulae and Interstellar Matter. By Jean Dufay. New York. 1957. Philosophical Library. 352 pages. \$15.00. For the professional astronomer and those generally interested in this subject.

Sunlight in the Lawn. By Beverly Nichols. New York. 1957. E. P. Dutton and Co. 255 pages. \$3.75. A new story by this popular author laid at Merry Hall.

The First Book of American History. By Henry Steele Commager. New York.

1957. Franklin Watts, Inc. 63 pages. Illustrated by Leonard Everett Fisher. \$1.95. Another in the "First Book" series by this publisher.

Zoo Quest to Guiana. By David Attenborough. New York. 1957. Thomas Y. Crowell Co. 252 pages. Illustrated. \$4.50. Story of adventure in British Guiana in connection with an expedition to photograph the wildlife and bring back live specimens.

The Dan Patch Story. By Fred A. Sasse. Harrisburg, Pa. 1957. The Stackpole Company. 172 pages. \$3.95. The story of the noted pacer, Dan Patch, and his unequalled career in harness racing.

Four Foot Town. By Caroline Tower. New York. 1957. Greenwich Book Publishers. 60 pages. \$2.50. The story of what happens when circus animals escape and try to live just like human beings.

Checklist of Coleopterous Insects of Mexico, Central America, the West Indies and South America. By Richard E. Blackwelder. Washington, D.C. 1957. U.S. Government Printing Office. Part VI. \$2.25. For the specialist in coleoptera.

Zoology. By Alfred M. Elliott. New York. 1957. Appleton-Century-Crofts. Second Edition. 746 pages. Illustrated. \$7.00. New edition of this excellent text.

Biology and Its Relation to Mankind. (Second Edition). By A. M. Winchester. Princeton, N.J. 1957. D. Van Nostrand Co. 902 pages. Illustrated. \$7.25. Carefully revised text of this introductory biology for a full-year college course.

Campsite Finders. By Richard and Jane Hartesveldt. San Martin, California. 1957. Naturegraph Company. Western Guide, 128 pages, \$1.50. Eastern Guide, 80 pages, \$1.00. How to locate quickly more than 2500 public camping sites in the western United States and Canada. The eastern guide covers more than 1500 public camping sites.

A Key to the Stars. By R. van der R. Woolley. New York. 1957. Philosophical Library. 144 pages. \$4.75. A book for the non-specialist by Britain's Astronomer Royal.

Light, Vegetation and Chlorophyll. By J. Terrien, G. Truffant and J. Carles. New York. 1957. Philosophical Library. 228 pages. \$6.00. Exposition of present-day knowledge of photosynthesis and related subjects.

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Nature IN PRINT

By HOWARD ZAHNISER

Echo Park Echoes

FOR SOME YEARS IT has been my annual undertaking to provide *Britannica Book of the Year* its article on "Wildlife Conservation," supplemented in some years with a separate article on "Wilderness Preservation." This has given me an annual occasion for reviewing the preceding year in the field, or fields, of my authorship—an interesting pleasure modified only by the distress of selection and writing. It has also given me annually considerable pleasure in receiving the *Britannica Book of the Year* when printed, and with it reviewing a past year in all the many fields of the volume's interest. This is usually a three-evening indulgence, followed, of course, with the timely reference use for which the volume is edited and supplemented with shared interests in its records of baseball, basketball, railroads, motion pictures, humor, and other such concerns of certain other members of the household.

Recent volumes have included extended "feature articles" enticing one into more-extended interests. This is particularly true of the 1957 volume, which begins with a 32-page discussion (encyclopedia-size pages at that) by Roscoe Fleming on "The Problem of Water," brilliantly illustrated, engagingly written, and accompanied by an annotated bibliography. Added to the annual articles, it certainly makes the 1957 *Britannica Book of the Year* a volume that attracts attention on this page.

What is significant

What has suggested this discussion, however, has been a somewhat curious reflection on our recognition and awareness of what is significant.

Were anyone to ask me to suggest the most significant events in 1956—the year covered by this volume—I should assuredly include the action of the United States Congress in removing the Echo Park Dam (in favor of alternatives) from the Colorado River water storage project and including in the authorization for this project the declaration: "It is the

intention of Congress that no dam or reservoir constructed under the authorization of this Act shall be within any national park or monument."

I should base this judgment of significance not only on the fact that this Congressional action ended five years of the greatest conservation controversy that we have had in our generation, but also on some general considerations. The principle of national park protection was reaffirmed after a challenge so strong that it involved passage, at first, by the United States Senate, of a bill that included the proposed dam in the Dinosaur National Monument. Resolution of the controversy was such as to demonstrate that huge water development projects could include both the construction of dams and reservoirs and provision for the protection of unspoiled wilderness. Surely, for many reasons, I should consider the Echo Park deletion, plus the inclusion of the national park proviso, as one of the outstanding significant events in 1956 conservation and water development.

Echo Park ignored

The Echo Park decision is not noted in Roscoe Fleming's feature article on "The Problem of Water," nor is the problem of respecting areas being preserved in their natural condition recognized by Mr. Fleming as an aspect of the water problem. Howard Zahniser says nothing about Echo Park in his article on "Wildlife Conservation," having assumed (I hope) that its significance was not pertinent to a wildlife meaning and would be noted elsewhere. His article does conclude with the invitation "See also National Parks and Monuments." But the article on "National Parks and Monuments," by Conrad L. Wirth, director of the National Park Service, says nothing at all about this outstandingly notable event in national park history. This is perhaps not surprising to those who know the facts of the controversy, for the Department of the Interior (of which the National

Park Service is one bureau and the Bureau of Reclamation another) had been the official sponsor of the Echo Park dam—in fact the last official advocate to withdraw in the face of the demonstrated public opposition to national park despoliation that militant conservationists outside the government had mobilized. In these circumstances the National Park Service had not even testified at the Congressional hearings on the issue, although the Service, along with Director Wirth, was recognized as actually deeply opposed to the Echo Park Dam.

The uncertainty of sole reliance on even such an excellent staff of devoted conservationists as comprise the National Park Service was clearly demonstrated, when a Secretary of the Interior could decide contrary to national park principles and thus eliminate the National Park Service from effective participation in the most significant national park controversy since the Service was established. The pungency of this demonstration is intensified by the realization, or assumption, that not even after the controversy has been resolved is it chronicled in an officially prepared article for a yearbook with the subtitle "A Record of the March of Events of 1956."

Nor does the *Yearbook's* article on "Irrigation" record the Echo Park decision, although it does report the dams that were authorized. Curiosity leads one to the article about the State of Colorado (without success) and then finally to the article "Utah" where at last the word "Echo" comes into focus.

Utah records event

Here, in Utah, the action of Congress in creating the Colorado River storage project is viewed as "the major event of the year for Utah," and in the course of a chronicle that is helpfully explanatory Brigham D. Madsen, lecturer in history at the University of Utah reports: "Conservation interests in the nation and California opposition led to the elimination of Echo dam from the program."

How elusive, indeed, is the goddess of history! Not even the word "park" persists in the name of the proposed site, and the action of Congress in eliminating dams from national parks and monuments on principle is not even suggested. What does persist is its most unfortunate misunderstanding, namely, that the

Echo Park dam opposition came from California water interests. These interests were bitterly opposed to the entire Colorado project indeed, and, in fact, were much disappointed when the conservationists, successful at last in having that Dinosaur National Monument dam removed and a park-protective proviso included, withdrew their opposition and thus made way for passage of the Act—as the conservationists well knew it would pass if relieved of their opposition. Proponents of the Echo Park dam during the controversy were prone to see the conservationists as tools of California water interests—thus for so long most unfortunately misunderstanding conservation leaders who were eager to be among their cooperators. And now in the single reference in a Yearbook for the year of the resolution of this controversy its most conspicuous misunderstanding creeps into the eighteen words of its history of "Echo."

Natural areas

A most notable outgrowth of the public interest in the preservation of unspoiled natural areas aroused during the Echo Park controversy has been a proposal for a national wilderness preservation system. The areas within this system would be protected through Congressional legislation that would strengthen the hands of the National Park Service, the U.S. Forest Service, and others who protect the Nation's heritage of wilderness. The 1957 *Britannica Book of the Year*, in its article on "Wildlife Conservation," includes a report on this development as follows:

"Approximately 20 of the national wildlife refuges and ranges containing extensive areas of wilderness were included in a proposed national wilderness preservation system advocated by Sen. Hubert Humphrey and Rep. John Saylor, and other legislators and conservation leaders. Proposed legislation to create the wilderness system which would comprise in all about 163 areas, including also units within the national park system and the national forests—was introduced in June, 1956, in both Senate and House of Representatives and was widely circulated and discussed as a major concern for the 85th Congress."

Fate of bills

It will be interesting to see what the 1958 *Yearbook* will record with regard to this proposal, which is,

indeed, now recognized as one of the major conservation concerns of the 85th Congress.

Focusing attention on the one elusive Echo Park point in current history has not been in criticism of the 1957 *Britannica Book of the Year* but rather in a curious recognition of the difficulty in knowing the significance of events in our own years. This discussion itself has had meaning only because of the recognition of the excellent and fascinating interest of this yearbook, and because the chronicle of events in the volume, which are here ignored, is one that can well merit the attention of the readers of this page. Perhaps it is too late this year to obtain a personal copy of a work published in a limited edition for which copies are contracted in advance, but public libraries as well as many family owners of *Encyclopedia Britannica* possess the volume. Wherever it is available it will afford interested first browsing and a resource for reference.

Britannica Book of the Year: 1957: A Record of the March of Events of 1956. Prepared under the editorial direction of Walter Yust. Encyclopedia Britannica, Inc. Chicago. Toronto. London. xxiii + 840 pp. \$12. (Described in its jacket as "an annual encyclopedia covering principal events of the past year through 1,000 significant articles—more than 1,000,000 words and more than 400 dramatic photographs, charts, maps, and cartoons.")

1001 Questions Answered about the Seashore

By N. J. Berrill and Jacquelyn Berrill. New York. 1957. Dodd, Mead and Company. 305 pages. Illustrated. \$5.00.

Visits to the seashore are full of interest and possibilities of Nature experience, yet the average visitor is perhaps less equipped to know what he finds and sees in such an environment than would be the case in other areas. N. J. Berrill is professor of zoology at McGill University, and with Mrs. Berrill and their three children makes a fivesome of expert beachcombers. Together they spend their summers exploring the tidepools, ledges and beaches of Maine and the islands that lie off the coast of the State. Beside providing information on seashore life seen and found, this book is fascinating to thumb through, reading its intriguing questions and the sometimes surprising answers.

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Reviews

Exploring with Your Microscope

By Julian D. Corrington. New York. 1957. McGraw-Hill Book Company. 229 pages. Illustrated. \$4.95.

Perhaps this book should properly be reviewed in our department "Nature and the Microscope." However, since Julian Corrington is its distinguished editor he might find it difficult to evaluate his own work. More than twenty years ago Dr. Corrington wrote *Adventures with the Microscope*, which was published by Bausch & Lomb Optical Company and is now out of print. More recently (1941) McGraw-Hill brought out his *Working with the Microscope*, a technical manual. There was an undoubted need for an abridged version of the first work, and one that would take into consideration advances in microscopy during the past two decades. So this present volume is largely made up of new material, although generally following the plan of the earliest book from his pen. The result is a volume that is for the beginner and for those who have found the microscope, and the world that it reveals, fascinating and wish to explore that world more thoroughly. Indeed, the author says that his book is "for you who take up microscopy as a hobby or avocation." We would say that this book is as necessary to the owner of a microscope as the instrument would be for one owning the book. R.W.W.

Reading the Landscape

By May Theilgaard Watts. New York. 1957. The Macmillan Company. 230 pages. Illustrated by the author. \$4.75.

At the Morton Arboretum, Lisle, Illinois, May Theilgaard Watts serves as the staff naturalist and has made a wide reputation for the ingenuity and freshness of her Nature and conservation teaching. This book is a graphic example of both of these qualities of her teaching. Many people—perhaps most—travel by train, bus or automobile and look at the landscape without really ever seeing it. That is, they fail to read the messages in forests, fence-rows, bogs, pastures, playgrounds, gardens, canyons, and the records left by wind, rain, fire, sun, shade and the animal life that has passed that way. Yet there is a fascinating story of change and of interrelationship everywhere, if one has only the eyes to see

AMONG OUR AUTHORS

Arthur H. Carhart is a well-known writer on conservation subjects, the author of several books, and a resident of Denver, Colorado . . . E. Pelham Wright, who heads the offices of the British Chamber of Commerce in Mexico, is a native of England, a resident of Mexico City, and a prolific producer of books and articles, many dealing with Nature subjects . . . Helen H. Seargeant, daughter of a cattleman of the old Arizona Territory, lives on a busy 160-acre ranch near Cashion, Arizona, and is deeply interested in the preservation of Arizona's natural attractions and historic landmarks . . . Gordon S. Smith was born and educated in London, became a chartered electrical engineer, and migrated to Buffalo, N. Y., in 1949 with his wife to launch a team of photographers-writers with a special Nature interest . . . E. Graham Ward, of Pittsburgh, Pennsylvania, who admits to an "insatiable curiosity about all living creatures," works for an oil company and does freelance writing in spare time . . . Dr. Theo. H. Scheffer, at a vigorous 90, is a retired biologist, and a collaborator with the U. S. Fish and Wildlife Service. He lives at Puyallup, Washington, and is an authority on the lives and habits of burrowing rodents . . . Ralph J. Donahue, of Kansas City, is a naturalist, and a writer specializing in Nature subjects, frequently contributing to Kansas City newspapers . . . Richard L. Threet is assistant professor in the department of geology, at the University of Nebraska . . . Barbara B. Paine, an amateur naturalist, informs us that the mushrooms she discusses in this issue were found within four blocks of her home in Cambridge, Massachusetts.

and the ability to understand. Here is a unique book that will open those eyes and make a trip anywhere far more interesting and informative. The reader will find it a rare experience to travel with Mrs. Watts, see what she sees and learn what to see on his own. R.W.W.

The Rainbow Book of Nature

By Donald Culross Peattie. Cleveland. 1957. World Publishing Company. 320 pages. Illustrated in color and black and white by Rudolf Freund. \$4.95.

"Come out and look" says Donald Peattie in the title of his first chapter in this large and lovely book, his first Nature book for boys and girls. The publishers indicated that the book is directed to readers ten years old and up, which sets no limits on the "up." Certainly many grown-up boys and girls will find pleasure in it. The author knows how to catch the interest of the reader—and he has aid from the illustrator in this—and leads boy or girl of whatever age along the fascinating paths of Nature.

Mississippi Calling

By Virginia S. Eifert. New York. 1957. Dodd, Mead and Company. 255 pages. Illustrated by Manning deV. Lee. \$3.50.

Many readers of *Nature Magazine* will recall the article Virginia Eifert wrote about her towboat trip down the Mississippi and the Nature observations this experience afforded her. Trips like that one, and her deep delving into the history of the river coincident with her work in preparation of her trilogy of books on Abraham Lincoln, appear to have made this latest book something that had to be written. Here, then, is the story of the Mississippi and its people from the days of the Glacial Era, through the time of DeSoto, Joliet, Marquette, into the period of the new nation and its westward expansion, through the days of war to the present. Ever alert to the Nature interest, Mrs. Eifert adds this to the historic and human story of the stream. Charmingly written, this is a fine addition to the growing library given us by this able Illinois writer, who is well known to our readers. R.W.W.

Tropical Fish

By Lucile Quarry Mann. New York. 1957. Sentinel Books. 130 pages. Illustrated in color and black and white. \$4.95.

This is a revised and enlarged edition of a practical book introducing one to the pleasures of a tropical fish hobby. The years since the earlier publication have seen changes in both species and techniques, and this new edition by the wife of the retired director of the National Zoological Park in Washington, Dr. William Mann, will be widely welcomed.

Briefly Noted

Limpy, Tale of A Monkey Hero. By Hyde Matzdorff. New York. 1957. John Day. 88 pages. Illustrated by Kurt Wiese. \$2.50. Well-told story of a monkey living in India and the source of one of that country's most beloved legends.

Seafarers and Their Ships. New York. 1957. Philosophical Library. 96 pages. \$3.50. The story of a century of progress in the safety of ships and the well-being of seamen.

Extinct Languages. By Johannes Friedrich. New York. 1957. Philosophical Library. 182 pages. \$5.00. The story of the art of deciphering forgotten languages and scripts.

Contents noted BY THE EDITOR

FLIGHTS OF MIGRATORY HAWKS along the northeastern ridges of Pennsylvania should be less hazardous this autumn. Word comes from the Pennsylvania Hawk Committee that the Legislature passed a law extending protection to all hawks migrating during the months of September and October on their flyways above the ridges between the Susquehanna and Delaware rivers. The law still protects the right of farmer or sportsman to destroy hawks attacking property or game. The legislation was not all that the Committee had hoped for, but it won the support of the Pennsylvania Game Commission and the Pennsylvania Federation of Sportsmen's Clubs, and appeared to be the only measure possible of enactment. With effective enforcement, which the Game Commission says will now be possible, it is believed that a great majority of the migrating hawks will now successfully navigate the region that has, except for Hawk Mountain, so long been a bottleneck and a lethal gantlet for the migratory birds. We will await with interest the results of the application of this law during the 1957 migration season.

ELECTRONICS IN THE SHOOTING BLINDS is a development deplored by the U.S. Fish and Wildlife Service. This modern invention takes the form of waterfowl-calling devices that realistically reproduce the sounds made by geese on the feeding grounds. The Service is studying the already demonstrated devastating effect of such gadgets with a view to outlawing or strictly controlling them. Electronic devices are charged with a considerable share in increasing the kill and crippling loss in one goose hunting State in the East during the 1956 season. In one of a number of cases, geese were lured from a Federal migratory bird refuge, on a windless and beautiful day that usually means bad hunting, to a blind five hundred yards away, five hunters quickly getting their limit. Indications are that these devices are fully as harmful as the use of bait and live decoys, if not more so.

OUR OUTDOOR RECREATION RESOURCES, present and potential, would be thoroughly inventoried if S.846, establishing a National Outdoor Recreation Resources Review Commission, becomes law. The Commission would not only take account of stock of our recreational resources but would evaluate them and project their ability to satisfy growing demands due to the increased population and leisure. Much information already exists at local, State and Federal level, but there

is a great need for the coordination and extension of these data. The Department of the Interior has strongly endorsed this legislation. In so doing Hatfield Chilson, Under Secretary of the Interior, points out that, in recent years, "there has developed more and more an appreciation of the natural and scenic beauty, and the wilderness areas that are a part of our national heritage." He urges that "recognition of this phase of outdoor recreation and appreciation be set forth with more emphasis in the bill." This measure is sound foresight, and it is hoped that it will receive a favorable report from the Senate Committee on Interior and Insular Affairs, of which Senator James E. Murray is chairman.

INTRODUCING FOREIGN ANIMALS to the habitats of our native birds or mammals is a risky business. We have Federal legislation to curb such practices and the law should, in our opinion, be rigidly enforced. What has happened in the case of the nutria is a case in point. This South American rodent was first brought to the United States in 1899, before we had legal barriers, but did not catch on. In 1937 some of the animals were introduced to Iberia Parish, Louisiana, to be kept within the boundaries of an "escape-proof" fence during experimentation. Two years later a storm proved the fence unsound and several animals escaped. Later fifty pairs were released. Prolific, the female bearing five litters in two years, on the average, the nutrias now range from the Mississippi delta to the mouth of the Rio Grande. They are also established on the West Coast. Vegetarians, the rodents compete with waterfowl and native muskrats for food. Their skin is difficult to prepare for the fur trade and the value is low. Trappers have little interest in them. So now the Fish and Wildlife Service is confronted with a frontal attack on the nutria, which never should have been brought here in the first place.

INSECTICIDES AND OTHER POTENT CHEMICALS used in agriculture and insect control would be comprehensively studied if H.R. 783, introduced by Congressman Lee Metcalf of Montana, is enacted into law. Ross L. Leffler, Assistant Secretary of the Interior, urges the passage of the measure, although at the same time expressing the feeling that the Department already has the right to pursue such studies. In endorsing the legislation he points out that when insecticides in concentrations ten times those tolerable to wildlife are used, losses in fish life are large, and other side effects of indiscriminate dispensation of agricultural chemical dangerous. We have had numerous reports of serious damage to bird life, particularly to warblers during the 1957 spring migration, and would be much interested in authenticated reports of wholesale destruction of insect-eating birds anywhere. Years ago, even before DDT and its more recent relatives were released for general use, we warned of what would result. We hope Mr. Metcalf's bill will pass, but if it does not do so soon it could well be too little and too late.

R.W.W.



Dig That Swamp!

By ARTHUR H. CARHART

AMERICA's wildlife in many areas is being crowded relentlessly toward a last-ditch struggle for survival. Our remaining wetlands, and all living things native to them, continue to be put in jeopardy. This is not a new situation, but it is an increasingly critical one.

The wetlands crisis has grown because of public indifference, widespread ignorance, and ruthless self-interest. However, probably the greatest threat to remaining marshlands lies in a pattern of thinking. Throughout the nation there is a fostered belief that gigantic, Nature-conquering water "development projects" are universally wonderful. Question the gains they are supposed to represent, and you are accused of impeding progress. Point to their destructiveness and failures, and you are called a crackpot.

Apparently we often accept slogan-born dogmas and magnify them into a spurious sanctity. Such dogma has led to non-reasoning acceptance of damming, diking, dredging and draining of any and all wetlands as altogether beneficial. Until there is careful and inclusive assessment of damages and losses through big-big water manipulations, and these losses are analyzed in comparison to hoped-for gains, our wetland wealth is threatened with progressive obliteration.

There are ways to achieve protection of remaining values. A first step is to consider the wealth that a marsh, swamp, pond, or pothole has in its unhurt state. Realistic values must be assigned to existing resources.

The effect of drainage on migratory waterfowl habitat

has been ably dramatized by conservationists and sportsmen. But protests have not stopped continued erasure of marshy havens that waterfowl must have to survive.

International treaties directed at saving this hemispheric wildlife resource have not sufficed.

Acreage acquired by public and private purchases and dedicated to serving waterfowl has been exceeded by drainage projects. Promoters of "water developments," by din and clamor, drown out protests based solely on the damage draining projects do to waterfowl. We must bolster the waterfowl issue with others.

Public Law 732, enacted in 1946, directed the U.S. Fish and Wildlife Service to prepare appraisals of wildlife losses and gains through Federal water projects. This seemed to promise protection for wildlife. But it merely required Federal water development agencies to "consult" with the Service on such projects. Consulting does not mean putting recommendations into effect, so in practice wildlife studies have been of limited scope and force.

Marshland habitat for songbirds is also a natural wetland value. The cheery *b'wa-ker-ree* of red-winged black-

Higher average temperatures, less rain and snow, drought, have increased during the past three-fourths of a century. Thus people have devised schemes for manipulating water, drying up wetlands.

Heavier storms during the 1956-1957 winter, and late blizzards, may herald a swing away from warmer and drier conditions and toward delivery of more water. With this may come demands for greater drainage projects. Thus man seeks to whip Nature into doing his will instead of husbanding Nature's gifts. This article tells a story of man's stupidity in this field.



Left, an excellent marsh in Minnesota provides food for fur-bearers and waterfowl, winter cover for the pheasants. Above, a western Minnesota marsh is being tile-drained, at the expense of waterfowl and muskrats that found hospitality in it.

birds, lacing through other sounds of spring-touched lowlands; rilling songs of wrens; the sweep of swallows skimming insects from just above reed-circled water mirrors, are priceless assets. But the esthetic values of these birds is at least

equalled by their service in control of insect pests.

Insect-eating birds had sanctuary in the fencerows as croplands were cleared of tree and bush, paying rent by ridding fields of insects. Then came the cult of clean cultivation. Fencerow habitat declined, songbird populations dwindled. Increasingly powerful poisons were sought to kill the insects. Then the pests developed immunities. So to suggest that marshland sanctuaries for songbirds can be a farmer's "ace in the hole," when poisons can no longer control destructive insects, is no more visionary than to give credence to many "benefits" claimed for water development proposals.

Fishing waters are destroyed by drainage and damming, costing us both game and food fishes. But no loss is greater than that suffered by the youngster who no longer may watch the dancing bobber, or "cork," that tells him a ringed perch, a bluegill, crappie, other sunfish species, or even a bullhead, is nibbling at his baited hook.

Even the humble muskrat is driven from his hereditary homeland.

Finally, there is one service performed by wetlands that has been disregarded as all logical objections are sacrificed for personal gain. Marshlands, bogs, and even moist earth, where water may be stored as film on microscopic particles of clay, are the natural "expansion joints" in our complex surface water system. As water falls on the land mass, it begins a struggle to return to the oceans. If we derive any service from water, then it must be attained between the raindrop and the river's mouth. This sounds trite, but it is the inexorable truth.

Supplying a gigantic sponge to hold back peak runoff, wetlands perform a great service. It is the held-back water, in marsh-like storage areas of the higher portions of watersheds, or in the soil mass, that maintains what we term the "water table." Such high basin reserves

Ducks rising from a pond in northern North Dakota show what hospitality there is in a wetland area.

U.S. FISH AND WILDLIFE SERVICE PHOTOGRAPHS





A wildlife marsh in South Carolina is a vital habitat for wildlife and for water storage. But when water is gone there occur such tragedies as at the left, where dead waterfowl lie strewn about, smothered by the dust of drought.



are the most certain insurance against wells going dry, against corn plants firing and dying as the August sun scorches and sears.

If some of the values found in the wetlands are of interest to limited groups, the high-basin storage function of such areas is a value of universal and vital interest. This service provides a potent argument for wetland protection measures. Above all others, farmers win or lose as high-basin water dwindles and drought destroys crops.

Well, where do we stand with regard to the types of lands containing these values, and offering these services?

After spending several years compiling an inventory, the Fish and Wildlife Service is able to supply the best information available. This is presented in Circular 39, titled *Wetlands of the United States*, which was published late in 1956 and is available from the Service.

Originally, we learn, there were 127,000,000 acres of wetlands inside the present boundaries of the nation. Of these, 45,000,000 acres *"have been completely destroyed by a combination of drainage, clearing and flood control."* The italics are ours; the authority quoted is James T. McBroom of the Federal Service.

Furthermore, an equal acreage has been so affected by drainage and its so-called "land improvement," that it has little or no value to any wildlife. To get such an amount of land in better perspective, *that acreage approaches five times the amount we have set aside in our entire system of national parks.*

Stated in still another way, we have lost almost three-fourths of the original wetlands with which we were endowed, and the native resource wealth they produced and maintained has literally gone down the drain.

Statistics of this nature should shock us into demanding some sort of corrective action. There are many of us who remember the ponds, potholes, and shallow rush-bordered lakes we once knew, and which are now drained and dry. Such places we fished as youngsters, or later watched waterfowl rise into dawn's brightening skies to resume flights to Canadian marshes. There we saw white cloud reflections drifting on still waters. These remembered acres are tabulated in that 90,000,000, now of little or no use to wildlife. They have been "improved!"

There is other highly significant material in this report, some of which fails to support the notion that all drain-and-dike projects are good or wonderful.

It is stated that 50,655,190 acres in thirty States, listed as "land drained," includes 12,400,059 acres "unfit for cultivation." An additional 9,176,046 acres produce "losses to crops," because the drainage system that upset their natural condition did not fully do the job. They are still too wet to grow cultivated plants supplying food and fiber.

Drainage has been the factor most responsible for the conversion of wetlands to some other status. But there are other "improvements" that destroy the native wealth of wetlands. The cutting of channels into fresh water lagoons along our coasts, to join them into ship-

ways, has allowed salt water to invade such basins. The result is a completely man-made ecological revolution; a dispossession of hereditary residents, both plant and animal. Tidal functions, not a factor before the canals were dug, further disrupt the prior ecological associations.

Ditches for mosquito control have ripped through thousands of square miles of marshland. The greatest damage, when this has happened, has been the elimination of open water that is vital to waterfowl. And with that has occurred the death of whole plant groupings, food pastures for wildlife resident in such swamps.

Roads across the lowlands, and fills supporting them, do their share of damage. And then there are city dumps, where some enterprising fellow has bought up cheap land, "fills" it and sells it as an industrial site with waterfront location. The dumps subtract more acres from native wetlands.

Although great areas may remain essentially quaking bogs, their usefulness in serving needs of wetland denizens are utterly destroyed by various pollutants. For example, oil wastes, when dumped on lowlands because "they are not being used for anything," not only kills wildlife habitat but holds lethal danger for waterfowl.

The types of wetland destruction reveal the motives behind them. Generally those who tinker and tamper with water wealth do so for personal advantage—losses can go hang!

There has been no sillier display of governmental stupidity than the pothole mess in the eastern parts of the Dakotas, southern Minnesota, and like areas. On the one hand the U.S. Department of Agriculture offers inducement to landowners, thus bringing about calamitous destruction of wetlands. At the same time Fish and Wildlife appropriations and Dingell-Johnson Act and Pittman-Robertson Act funds must be used to *re-establish* wetland habitats. Paying landowners to drain little lakes and marshes, and thus add a few acres to produce more crop surpluses, meant 300,000 potholes drained in this area within the last decade or so. A total of 1,000,000 acres was thus dried up, an estimated one-fourth of the duck-breeding habitat within United States' borders.

In June, 1955, a South Dakota Congressman sought drought relief in 26 South Dakota counties. *All but three of these* were in that area where the potholes had been dried out. There are many strange twists to this sort of program.

For example, in 1955 a farmer in Nelson County, North Dakota, was persuaded to drain 90 acres of his marshland. He was paid \$68.62 per acre by the Soil Conservation Service for so doing. He was supposed to put an equal amount of his own money into the project. To this was added an estimated 11 percent of the total, for "engineering" done by the S.C.S. That brought the "improvement" cost of this land up to approximately \$150. In that area natural cropland, improved and in tillage, reportedly could be bought for some \$35 to \$45 per acre!

There can be no denial of a landowner's legal right to

for August-September, 1957



A good marsh, such as this one in North Dakota, provides the required habitat for raccoons and many other species of fur-bearing animals. Drainage brings their inevitable doom.

Sora rails, as well as other species of rails, live and nest in the marginal vegetation of marshlands. Many are the birds that have been dispossessed by drainage projects that have no heed for other values.



drain any land he owns. However, can one deny a citizen's right to question *paying* an owner to destroy existing wetland, valuable to the community, and probably to himself?

Under a headline "Drainage Will Be Kept in Farm Aid Program," the *Milwaukee Journal* of December 30, 1956, quotes two consecutive sentences, among others, of an interview with Assistant Secretary of Agriculture Erwin L. Peterson. They are: "Instructions have been given to ACP (Agricultural Conservation Program) and SCS (Soil Conservation Service) to tighten up, but we do not feel that drainage can be eliminated as an approved practice (in these programs). Our job is to help the farmer and we feel that if drainage will help him he should have it, unless there is a good reason why not."

Would it be a sufficient reason if it were pointed out that by the record this business is against over-all public interest? That could be proved. Common sense could prove it in many, many instances. Doodling with, or tinker-tampering with, public wealth in basic natural resources, means someone having a big try for the easy dollar. Water wealth is no exception. Just one more case history further to affirm this.

Four decades ago the gates of New Mexico's Elephant Butte were closed. This great reservoir, which then had a storage capacity of 2,638,860 acre-feet, began to hold water. Only once has that big storage tank been full. The Rio Grande's overgrazed watershed bled silt, which was transported to form a delta at the head of Elephant Butte reservoir. A "hidden dam" formed, and back of it the Four Lakes of San Marcial were born.

The big reservoir fluctuated. Since 1942 water above Elephant Butte Dam has been shrinking and shrinking. Three years ago gauges showed only 17,000 acre-feet of water in the big tank.

At that juncture the Army Engineers began a "channelization" project. A deep channel was dredged up river for some 26 miles. A few cried out against the destruction of the Four Lakes of San Marcial, but the cotton farmers down river were promised acres and acres

of water to be delivered ever afterward if those lakes were drained. Even tamarix thickets around these lakes were destroyed to "conserve" water.

The lakes *are* drained. The tamarix *is* dead or dying. One of the few nesting spots of the scarce New Mexico duck, and the homes of two species of egrets vanished. Tens of thousands of waterfowl that used those San Marcial lakes were dispossessed.

As of March 15, 1957, Elephant Butte reservoir had only 77,904 acre feet of water in it; a year earlier it had had 210,000. The draining of the Four Lakes of San Marcial, the killing out of the tamarix bushes, produced a one-shot run of water, but this did not cure the over-all drought that caused this near-desert mudhole at the bottom of Elephant Butte reservoir in March, 1957. But it surely was the lack of sanctuary in the current-freshened lakes of San Marcial near Elephant Butte that cursed ducks with botulism early in 1957, where mud edged the remaining water in the reservoir.

It was drought, plus plowing of grasslands encouraged by Government subsidies, that created the dustbowl, where, one April evening, wind poured dust into a 20-acre pond so swiftly that migrating waterfowl were caught, and died in the mud while the pond disappeared.

It is personal gain and bureau ambition that has drained so much of the Tule Lake Wildlife Refuge near Klamath Falls, Oregon, and now continues to incite talk about further drainage to add more cropland to the nation's tilled acres and dispossess all wildfowl at that location.

It is the idea of gain, not need, in all of these instances, that has brought on the destruction of the wetlands and their wealth.

Can wasteful dissipation of this existing wealth be halted?

The key to halting it lies in a far more general realization that as rampant water manipulation projects go crashing ahead, draining, diking, damming and dredging, there can be, often there are, losses greater than the hoped-for gains. Certainly (*continued on page 387*)

This fine wildlife marsh in southeast Oregon provides plenty of food and cover for resident mammals and birds, and for many migrants.



Well known through Latin America, and national tree of Guatemala, is the *ceiba*, source of the raw material for kapok. Christopher Columbus is said to have tied his ship to the *ceiba* in this illustration, at Ciudad Trujillo, Dominican Republic.

PAN-AMERICAN UNION



Latin-American Nature Symbols

By N. PELHAM WRIGHT



Venezuela advertises her national flower, the orchid *flor de mayo*, on an airmail stamp.

Although Benjamin Franklin leaned to the wild turkey as the national avian emblem, the bald eagle is the American bird. However, despite a poll conducted some years ago by *Nature Magazine*, in which a plurality of more than one million votes favored the wild rose, Americans have thus far struggled along without a national flower.

Nor have all the twenty Latin American countries,

Flags, coats-of-arms and figures of heroes in bronze and marble are symbols of national pride in past and present. National anthems express the spirit of the peoples of a nation. More recently, in most cases, nations have turned to Nature for further symbolism, choosing a bird, a flower, or a tree as distinctive insignia.

All of the States in the United States have State flowers; most of them have official State birds; some have State trees; a few have a mammal as an emblem.

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with their rich and varied flora, as yet formally adopted flowers and trees as national emblems. Yet some of our neighbors to the south have formally selected a flower or tree, or both, as a symbol. In other countries such insignia have achieved official standing by popular acceptance.

Mexico is one country that has taken no official action, but where interest in both a national tree and a national flower has been active. Not long ago, a Mexico City newspaper conducted a poll, among the capital's feminine horticultural experts, to find out what they considered should be the national flower. The results included the single dahlia, the tree dahlia, the poinsettia, a red poppy, the rose, the flower of the "colorin tree," *Erythrina americana*, and the flower of the *nopalillo*, or orchid cactus. The flower of the *nopalillo* seems typically Mexican, although it grows in many other countries; and it might be added that the poinsettia, called *nochebuena*, because it flowers around Christmas-time, is also worthy of representing the country. Although it was named after an early ambassador from the United States to Mexico, Joel Poinsett, it grows much more strongly in certain parts of South America than in Mexico.

Every country in Latin America includes in its flora



PAN-AMERICAN COFFEE BUREAU

Since El Salvador's economy depends largely on coffee growing, her choice of the coffee-tree and flower as national emblems seems logical.

some species of orchid—to many people the most glamorous of the flowers. It seems logical, then, that no less than seven nations—Panama, Venezuela, Brazil, Colombia, Ecuador, Costa Rica and Guatemala—should have chosen orchids as national flowers, and that at least three should have publicized their choices on their postage stamps.

Argentina's national flower is the large red blossom of the coral bean tree, *Erythrina crista-galli*, known as the *ceiba*, a shrub that normally does not exceed twenty-five feet in height. It is one of the "government supported" flowers, for Argentina considers the *ceiba* typical of the country, although Uruguay has adopted the same flower. Ecuador has chosen the blossom of the quinine-tree, *Cinchona succubia*.

Because of topography, it is not surprising that Peru and Bolivia have adopted the same flower, known in English as the Inca magic flower, to science as *Cantua buxifolia*, and locally as *kantuta*, *cantua*, or *khuntua*. It is a particularly beautiful blossom, purple, pink and orange, most worthy of supporting the legend in which it is steeped.

Paraguay has chosen her local form of jasmine, *Brunfelsia bopeana*, and Cuba's decision was for a white, highly perfumed flower called the *mariposa*. It is the *Hedycheilium coronarium* of botany, belongs to the ginger family, and is called in English the amber cane, or ginger lily. The Dominican Republic has chosen the blossom of the *caoba*, or mahogany.

Chile's national flower is another beauty, the red *copihue*. This is the flower of a climbing plant, *Lapageria rosea*, and everyone who knows the central Chilean countryside in spring has a soft spot in his heart for it.

Honduras considers the rose her national flower. The neighbors in Nicaragua—popularly but not officially—

have adopted a local yellow form of the frangipani blossom, *Plumeria acutifolia*, that they call *mayita* or *sacuanjoche*. The latter meant "yellow flower" in the Chorotegan language. The people of El Salvador have naturally been persuaded that the blossom of the coffee-tree is well suited as their emblem; but the Haitians seem as yet to have expressed no preference.

Trees are, of course, more important economically in the life of a country than are flowers. Mexico apparently has, in times past, regarded the *ahuehuete* tree, familiar in the United States as the bald cypress, as a national symbol. The Nahuatl word *ahuehuete* is roughly translated as "the never-aging tree." This imposing giant is also known as *sabino*, and its scientific name is *Taxodium mucronatum*. In Mexico City's Chapultepec Park there are many such trees that have been flourishing since the Aztec emperors strolled in the gardens there, during their leisure hours. One specimen in the little village of Santa Maria del Tule is accepted as being more than a thousand years old, and perhaps the third or fourth largest tree in the world.

Royal palms flourish along the road between Havana and Matanzas in Cuba. While most citizens of Latin America are familiar with palms, only Cuba and Haiti have made the palm a national emblem.



Colombians have embellished their letters with *Cattleya trianae*, their national flower-emblem.

PAN-AMERICAN UNION





The *monja blanca*, or white nun orchid, is the national flower of Guatemala.

It grows naturally only on the coastal plain of El Salvador; but the misnomer came about when the Spaniards, after the Conquest, learned of balsam's medicinal qualities and began to import it. In those days, almost everything from Spain's American colonies not originating in Mexico was channeled through Peru, and balsam was no exception. Consequently, *balsamo del Peru* was shipped from Cuzcatlan, as El Salvador was then called, to Lima, only to be returned to Central America for laborious transportation across the Isthmus of Panama for re-shipment to Cadiz! It has never lived down its reputation for being Peruvian, much to the chagrin of the Salvadoreños, who control the world output.

Guatemala's national tree is the huge *Ceiba pentandra*, a tree well known all over Latin America, with at least fifteen different local names. It attains a height of 150 feet, often has a buttressed bole, and produces *pochote*, the raw material of kapok.

The tree-symbol of Honduras is the pine, of the greatest economic importance to most Honduran country-folk.

When the government decreed a national tree in 1926, a professor, in an official publication, expressed the desire that "all Hondureños should endeavor to be as vertical as our national tree!"

In spite of the wide distribution of palm trees in much of Latin America, only Cuba and Haiti have chosen the palm as a national symbol. Both have selected the royal palm, *Roystonea regia*, and both have incorporated it into their coats-of-arms.

The central and southern countryside of Chile is brightened by the bloom of her national flower, the beautiful red *copihue*, botanically known as *Lapageria rosea*.

PAN-AMERICAN UNION

El Salvador, at least at one international exhibition, has presented the coffee-tree as a national emblem; and because her economy is almost entirely based on coffee, the choice seems proper. Nevertheless, the authorities evidently feel an allegiance also to the so-called *maquilishuat*, a splendid hardwood with a fine blossom, botanically known as *Tabebuia pentaphylla*, and the Peruvian balsam. The latter name claims a place of honor in the gallery of outstanding misnomers.



PAN-AMERICAN UNION

From the bark of *Cinchona succirubra*, whose blossom is the national flower of Ecuador, comes the quinine so important to malaria-infested areas of the world.

The Dominican Republic considers its tree to be the mahogany—the *caoba*, or *Swietenia mahagoni*.

In South America, Paraguay has adopted the *lapacho* or *tyri*, her most valuable hardwood, another *Tabebuia*. It is not surprising that Chile associates herself with the typical *Araucaria* pine that we call in English the monkey-puzzle tree; that both Peru and Ecuador share

as a symbol the quinine-tree, *Cinchona succirubra* of medical fame, and that Peru has it in her coat-of-arms.

Venezuela has taken to her heart, with considerable poetical rapture, a fine flowering tree the Venezolano call *araguaney*, *T. corymbosa*. Panama's choice is a huge growth called *Sterculia apetala*, the Panama tree, known in Mexico as the *bellota*.

The last in this procession is the *ombu*, beloved in Argentina and Uruguay, where the public considers it their national tree. The *ombu* is a large-leaved, softwooded spreading tree, *Phytolacca dioica*, that in some parts of the limitless pampa





FROM A HELEN O'GORMAN PAINTING

offers virtually the only shade; and gauchos gather under these friendly trees during the mid-day heat of

The flower of the *nopalillo*, or orchid cactus, has been proposed as the national floral symbol of Mexico.

summer. Little wonder that the *ombu* is a much-loved tree! The natives say that before the arrival of the white man, the Pampa Indians often planted these trees in rows as direction indicators, for travelers crossing the vast expanses of featureless countryside. And it is a fact that such artificial-looking rows of *ombus* are no rarity.

These, then, are the flowers and trees that to the citizens of the Latin-American nations best seem to incorporate the national spirit they wish to express. There is something of the colorful, something of the romantic, and something of the practical—and it would indeed seem unappreciative to ask for more! 🌺 🌺 🌺

Gumweed

By MILDRED FIELDER

Photograph by John Fielder

If you are a native of the vast central expanse of the United States, the chances are that, in the days of your childhood, you were mightily intrigued by an interesting and colorful weed of the dry roadside and the otherwise drab waste places. You could take the yellow blossom, as round as a ragged button, stick it to the tips of your fingers, and there it would remain like the padding on a piano key. You did not know then that it was called gumweed, sticky-head, or gum-plant. You did not care. The delight you knew was derived by waving your decorated fingers and knowing that the flower heads would not come unglued until you wished them to.

This member of the thistle family is known more precisely as *Grindelia squarrosa*, and while it has no thorns like some thistles, it grows as wildly and as prolifically as the grass in the fields, preferring waste places, dry plains, roadsides, and back alleys. In the late summer it is a splash of gold where it is left untouched.

Once, long ago, it was believed to have medicinal qualities. The sticky tops and the gray-green leaves were boiled together to make a decoction believed valuable for a number of ailments. The brew was given to children for colic or to older folks for consumption. With an eye always on the comfort of man's faithful helper in the early days, our forebears knew that the



Known to children of the plains country as gumweed, this member of the thistle family adorns dusty roadsides.

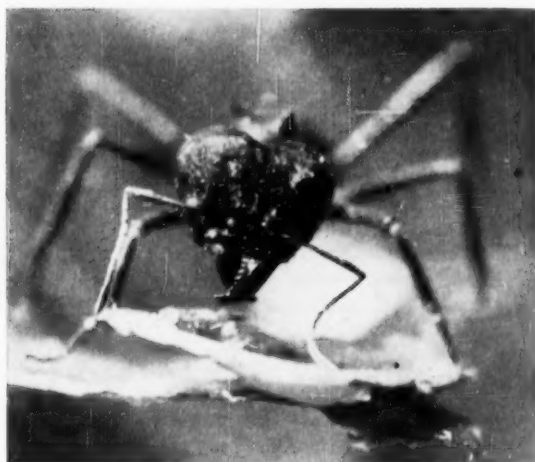
decoction had a beneficial effect in treating saddle galls or sores on horses' backs.

The horse is today almost a curiosity in many places, and while colic and consumption may remain, one does not use the gumweed to treat them. There seems little use for it at all, in fact. The plant shrieks "weed" if one tries to gather it for a cut-flower bouquet, and it is too sticky to use in the lapel. Best to let it grow as it pleases, coloring the wayside places and painting the forgotten corners. 🌺 🌺 🌺

Atta, the Engineer

By HELEN H. SEARGEANT

Photographs by Paul Griswold Howes

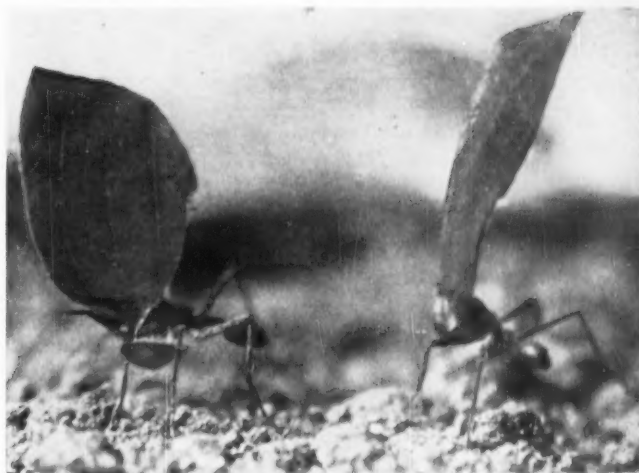


A head-on view of a warrior leaf-cutter ant, greatly enlarged. The warriors are charged with the defense of the colony, and are armed with large, serrated mandibles. A disturbance in the neighborhood of the ant-hill brings the warriors out to investigate.

WE HAVE a considerable store of information concerning the life of the *Atta*, that little six-legged scientist, frequently called the umbrella, parasol, or leaf-cutter ant, and some interesting accounts of his community mushroom-growing and other social activities. But we find little on the subject of his engineering projects.

In my home near the Guatemalan border in southwestern Mexico I had a good opportunity to observe the behavior of these ants outside the nest. In fact, the observation of their doings was actually forced upon me. Because of their persistence in cutting the leaves of my rose hedge, and my objections to such behavior, I was brought into close contact with their engineering talent.

There were some extensive *Atta* colonies on the forest-covered ridges near us, but our small colony had started on deforested land that had been in corn fields for some



Sometimes called the "parasol ant," the leaf-cutter does not hold his leaf-fragment over the head like an umbrella, but instead carries it flatwise, to make it easier to run back and forth along clean-swept trails.

time. There were none of the trees that the hill colonies seemed to prefer as mushroom material. Apparently, for that reason, our *Atta* generals were determined to have my rose hedge. There were plenty of other leaves all around them, but they wanted rose foliage; and they went to a great deal of trouble to get it.

These ants are most efficient and businesslike, and they are extremely neat in their leaf-cutting. As long as there are plenty of leaves on a plant, they cut only perfect little circular pieces, about one quarter of an inch in diameter. They clear beautiful, clean-swept trails wherever they plan to send their workers to run back and forth; and run they do. There is no time for them to stumble over obstacles. "Leaf-cutter" is a good name for these ants; but to call them umbrella, or parasol ants, is a great stretch of the imagination. They do not carry the leaf flatwise above the body, but balance it edgewise above their heads. This is the only way they can both hold it and run with it. As for using it for a shelter, when they know a shower is coming—and they

This enlarged photograph gives a good idea of the general appearance of the queen leaf-cutter ant, after the wings have been lost. The great size of the queen may be judged by comparison with the ants in the illustration directly above, which are enlarged to the same degree.



do know it, in some way—they drop their leaves in a pile on the path, and run for home with all possible speed. In addition to carrying leaves, they would carry whole grains of corn in the same way. One ant-power moves a grain of corn, without dragging. What happened to the corn after it was brought home, I never learned.

During their corn-carrying operations, we noticed that there were a few large ants running back and forth among the workers; evidently they were teachers, helpers or general overseers, as one would sometimes help a worker with his load. In one instance, I saw a helper pick up a grain of corn that a small ant was trying to lift, hoist it up, ant and all, and march off in the train with the small ant riding.

I found also that there were home guards at the ant hill, but that they came out only when there was a disturbance. I made a disturbance, by pounding on the ground at the base of the hill with a shovel, and out came a company of the big defenders in a rush. They were an inch long, with exceptionally big heads and powerful clippers, and they meant business. It was lively work, fighting them off with the shovel to keep them from nipping me, but they soon learned it was a one-sided battle, and refused to come out again.

My father had done a small engineering job of his own—putting in a small diversion dam in our creek, to bring a ditch out on the flat occupied by our residence. It was about eighteen inches wide, and there was enough fall for a free-running stream about six inches deep throughout the year. The ant hill was north of the ditch, and one would suppose that such a steady stream of water would be an impassable barrier to an ant. So it would have been, to a common ant, but not to our *Atta*.

It was a rainy country, and plant life was luxuriant. We had to keep the weeds cleared away from the ditch banks or they would have soon been grown over by morning-glory vines; but occasionally a tendril would creep across, making a bridge for the ants. I am sure they kept a scout on the ditch bank, for they never lost an opportunity; they even followed the curve of the ditch for a considerable distance to find a bridge, although it made a long road home.



A leaf-cutter ant receives cooperation from a companion in moving a large leaf fragment. One of the ants is butting with its head, while the other is juggling with its feet.

They also were carrying leaves from a similar hole on their side of the ditch. They had engineered and built a subway!

Now, the last bridge they had used had been almost south of the house; but when they had decided to make a tunnel their engineers went back and surveyed a straight course to the rose bushes. They had commenced their tunnel about six inches from the edge of the ditch, and had come out on the other side about the same distance from the water. The tunnel was about four inches below the bed of the ditch.

How were these ants able to measure the width of the ditch and the depth of the water? I was tempted to suppose that they had taken measurements during a crossing of a previous vine bridge, and had filed notes for future use. But, again, how were they able to measure the depth of the water? There are many people who balk at the notion that intelligence, or the ability to apply reason to a problem, may be found in animal species other than their own. Yet, what must we think when we find that humble *Atta*, the leaf-cutting ant, can measure and judge like the human, can conduct farming operations in the most accomplished manner, and can organize for the defense of a colony in the same way that men organize for the defense of a nation? In spite of the assault on my rose hedge, I felt that my insect engineers certainly had earned the rose-leaf circles they were carrying off to their farms!

My *Attas* obviously know the answers to some interesting questions—but they are keeping them a secret.



The five leaves of the illustration show the neat work of the leaf-cutter ant, whose talents range from engineering to mushroom growing.



The head of the female red-winged blackbird is blackish on top, and her body is mottled and striped above and below with brown, black and off-white. Now and then a pronounced shading at the epaulets is noticeable.

A merry, lovable chap is the

Casanova of the Marsh

By GORDON S. SMITH

Photographs by the Author

O-KA-LEEE, *o-ka-leeee, o-ka-leeee*. The monotonous song vibrated from all directions of the Buckhorn Game Refuge near Niagara Falls. The very notes suggested a boggy ooze. Through the air, warmed by the morning sun, and dampened by the moisture from treacherously soggy turf, the vocal sounds were pitched from reed to sapling, and back again. *Konk-la-reeee, konk-la-reeee, konk-la-reeee!*

I handed our binoculars to my wife, and pointed to one particular bird on a young tree. "It's black," she said, "and glossy, too. About nine inches long. Has colored epaulets of a brilliant red with a yellow margin. Its beak is also dark. I should say that this one is a vigorous male red-winged blackbird."

We stopped a few minutes to watch and hear him sing. He raised the forepart of his wings well out from the shoulders, showing those beautiful epaulets, lowered his head to bow, and spread his shiny black tail. There was a pause. Had he forgotten those words, or was he teasing his audience? Then he emptied his heart. *O-ka-leeee!*

It was the beginning of June. The female red-winged blackbirds were in the midst of their nursery chores,

and their trimly-tailored males were on guard nearby.

These birds had migrated from the South many weeks ago. The males arrive in March in enormous flocks, and to pass the time until the females appear, they select trees as "club rooms," and have continuous bachelor parties. By the end of April they conclude their merriment and scatter, each male actively pursuing the females, and staking out his plot of land. In many instances, it is only necessary for him to perch on a high point and sing *O-ka-leeee, o-ka-leeee*. Not very fascinating, but it attracts the girls!

Eventually, a male will single out his mate; and, having staked his land as

The young male raised his wings, lowered his head, and paused a moment before he sang.



O KA-LEEE



It is typical of the female red-wing to balance on the arch of her nest, in order to get a preliminary view of her eggs or youngsters.

well, bravely guards his possessions against intruders. It seems that some males never secure a wife—they just sit and sing. It might at first appear that there are not enough wives to go around. Yet, other males seem to secure two, and on rare occasions, three wives. Perhaps these males are more vigorous, or more ardent in their love-making. Or possibly they have bigger and better estates to offer.

Wallace Kirkland, in his book, *Recollections of a Life Photographer*, recalls an assignment on the red-wing. He was assisted by Bob Nero, a graduate student of the University of Wisconsin, who was gathering material for his degree in ornithology. The latter had spent six years in the field studying the red-wing, and he stated that it was possible to stake out, to within a foot, in a kind of grid system, the plots of each male. Apparently, territory violation by a neighbor of more than a foot can create a minor war.

May is the nesting season, and here is a peculiar thing. The construction of the nests is substantially similar, and they consist of dry grass, stalks and rushes woven into a deep, firm basket lined with finer grasses. Red-wings are birds of the marsh and open field, and one would expect to see their homes amongst the reeds, the cat-tails, or even a bush. Yet they build on tussocks of

grass, or on beach ridges along the seashore. And, to add to the confusion, they may select a fork in a tree, twenty feet up.

We moved slowly forward again. A long line of reeds in a small ditch took our attention. Feeling sure that this male had more than one wife, we were alert for the first sign of movement there. Farther back, we had seen the single nest of another family in the reeds, so we concentrated on this new stretch of ditch.

The grass rustled in front of us. My wife stiffened, and a garter snake slithered hurriedly out of our way. The male red-wing, still on his perch, said *o-ka-lee-ee*.

They immediately flew up together, not more than thirty feet away. Hurrying over, we slid down the muddy bank, and found nest number one. It was suspended on last year's reeds, and had a canopy to protect it from searching eyes. There was a single egg inside. It was pale blue and oddly streaked, spotted and scrawled with black. Surely, someone with pen and india ink had splashed it. The majority of the markings were at the larger end. We took a photograph, and moved on.

Ten feet away was the second nest, lower than the first, and a foot above the water. It was constructed like



The mother red-wing viewed the author's photographic efforts with disapproval from a nearby perch, but finally alighted timidly to view her single egg.

The egg of the red-winged blackbird is pale blue, and oddly streaked, as though someone with pen and ink had splashed it.



the first, and had three nestlings and two cool eggs. I set the camera for a close-up, using a tripod to reduce vibration—always a source of trouble at close range—and jammed the legs well down into the mud and water. I used one flash bulb to get into the dark corners, covered the reflector with a handkerchief to reduce the harsh light, and gently tapped the nest with my knuckle to imitate mother returning. Up popped three heads, with mouths wide open for food, and I secured a shot of scraggy necks and glistening mouths.

It is typical of a female to balance on the arch of her basket-like nest, and view her eggs or brood. So, to get such a shot, the camera position was changed, and a remote control attached. I ran this out to where my wife was watching the proceedings, and sat down with her to await events.

In a short time the two females were back, nervously overlooking, from two nearby bushes, their respective

nests and the newly arrived monstrosity. Bird number two had the least to worry about, being farther away from the camera, and was soon sitting on her brood. Bird number one fluttered around for a while, deciding that it might be safe, but unable to make the final courageous effort. She alighted timidly a few times and pecked uneasily at her one egg. Her head was blackish on top, and her body mottled and striped above and with brown, black and off-white below. At times, she had a perceptible shading at her epaulets, and the bill was sharply pointed. She eventually settled on her egg.

A couple of hours sped by pleasantly, as we observed and photographed the two ladies and their gentleman. Two yellow warblers, surveying for a home, were gently but firmly discouraged, and one grackle came too near and was roughly handled. Red-wings have been observed to ward off attacks, with help from the females, of marsh hawks, bitterns and even ospreys.

Later, the whole family took off. There was no apparent reason for this, and they remained out of sight for twenty minutes. It is known that red-wings hunt for food, like cankerworms, gypsy moths, tent caterpillars, weevils, click beetles, wireworms, and other insects, as far as a half mile from home, and this may have been one such outing. They returned as a happy group.

The mid-day sun was beating down upon us sharply, now. Our clothes were sticking to our sweating bodies. We had upset this family long enough, and we were (continued on page 387)



The author imitated mother's return by gently tapping on the edge of the nest with his knuckles. Three tiny heads popped up, with mouths wide open, ready for such tidbits as cankerworms, tent caterpillars, or click beetles.



Within Cook Forest State Park, in northwestern Pennsylvania, are trails that lead the wilderness wanderer through wooded hills and deep ravines of the Allegheny Mountains. With an area of some 6000 acres, Cook Forest State Park contains the largest stand of virgin hemlock east of the Rockies.

Trails of Cook Forest

By E. GRAHAM WARD

Photographs courtesy of Pa. Dept. of Forests and Waters

"THERE'S NOBODY here but us and God," the small boy whispered.

My eight-year-old son and I were seated on a moss-covered log in the heart of Forest Cathedral in Cook Forest. No more fitting name could be found for such a sanctuary of giant hemlock and pine, standing as an imposing monument to the Creator's work.

Situated in northwestern Pennsylvania, on Route 36, about one hundred miles from Pittsburgh, Cook Forest State Park contains the largest stand of virgin hemlock east of the Rockies. Bounded on the east by the placid Clarion River, the park's 6000 acres cover an expanse of wooded hills and deep ravines formed by the Allegheny Mountains. Many of the oldest trees in the park are estimated to be aged 200 to 500 years, with diameters of three and four feet. Certainly no one can visit this place of luxuriant plant growth and abundant wildlife without a real sense of being a part of the primeval forest that was flourishing before the early white settlers came to America.

Small wonder, then, that my son whispered, "There's nobody here but us and God." We were sitting beside Longfellow Trail, looking up into the 200-foot ceiling that whispered above our heads. All sounds were soft and muted, like the murmuring of some great heartbeat. The delicate patter of falling pine needles and the far-

away chatter of a squirrel blended into the peace and beauty of the place. Harmony flowed around us.

It had been a fitting place to stop, after our slow climb up the gentle slope. We had walked slowly, not because of the grade, but to see the many wonders of growing and living things about us. There had been a saucy, bright-eyed chipmunk who watched us, then scampered away at our first move. A bit of bright color had taken us a few feet off the trail, and we discovered a brilliant orange fungus glistening as though freshly varnished as it clung to a decayed stump. Bracken and ferns spread their feathery fronds in the small open spaces where the sun stabbed to the forest floor.

There is magic in the trails of Cook Forest, compelling one to walk on and on. More than thirty miles of pine-cushioned paths, with such fascinating names as Mohawk, Seneca, Joyce Kilmer, Deer Park Trail and many others, invited us to their ends. One of the most alluring of these is Nature Trail, which carried us through birch groves, sunny mountain meadows and deep pine-scented ravines. In the open stretches we saw many varieties of wild flowers; deep rose mallow with heads bending over the chuckling brook; sun-yellow ladies'-slippers dotting the tall grass with brightness; and many more that we could not name, but could only enjoy. As we strolled along, we came upon small signs identifying

certain trees, or pointing the way to a small cave housing a family of porcupines. Others had come this way before, and had placed such bits of information for those who, like us, had much to learn from the book of Nature. This particular trail led us in a wide circle up and over a wooded ridge, and back to the River Road. The magic of discovery blotted out all thought of weariness, but when we finally reached our cabin, I realized that seven miles over mountain trails can make a city-bred person truly ache.

The log cabin we had rented was one of eleven rustic buildings, set in a semicircle on the site of an old Indian campground. Nestled under giant hemlocks and pines, the well-constructed cabins blend into the natural beauty of the place. They are maintained by the Pennsylvania Department of Forests and Waters, and are equipped with comfortable beds, refrigeration and gas cooking facilities. A nearby spring provides fresh water. While Cook Forest is primarily a wilderness area, at the entrance will be found the Cook Forest Inn and the Indian Cabins. A spacious trailer and camping ground accommodates travelers who carry their own equipment.

To reach the highest promontory in the Park, we climbed and puffed up Seneca Trail, past springs that ooze from under great tree trunks and around huge boulders, velvet green with bearded moss. The arduous ascent of a mile and one-half was well worth the effort when we finally reached Seneca Point. We stood on a great slab of weather-carved sandstone, and looked far down to the Clarion River, writhing its silvery way through the valley. During the formation of the area that is now Cook Forest, which was at one time a high sandstone plateau, earth upheavals and subsequent erosion created deep ravines and high bluffs. With a little imagination, we could feel the presence of the great Seneca chief, Red Jacket, standing on this very bluff, watching the white men push their tiny boats up the river.

We returned to our cabin by way of Deer Park Trail. As we rounded a curve in the trail, we detected something moving ahead of us, and we stopped and watched, fascinated, as five deer crossed the path. They moved slowly, pausing to stare

at us in curiosity, then glided noiselessly into the underbrush like five rust-colored shadows. We continued on our way, making the easy descent of Deer Park Trail in a short time, noticing the many funguses springing up from the cool, damp corners of rocks and stumps. Some were pale and creamy, the size of dinner plates; others a deep tawny brown, no larger than thimbles. One particularly eye-arresting type stood about four inches high, of a bright lemon-yellow color, and waxy in texture. During this September trip to the Forest, we found more varieties of funguses than at any other time of year.

We traveled nearly thirty miles of trail in one week, and each day brought new discoveries. Even the nights gave us glimpses of the wildlife that lived within the protection of the park boundaries. One night, we placed a small opened can of sardines on the rustic table outside our cabin door, and then sat in the car waiting. Soon we heard rustlings, and made out a small dark shape clambering to the table top. We turned the flashlight on, and saw a large raccoon making a meal of the fish. The visitor looked up as the light flashed, but made no

attempt to run. I spoke quietly to my son, who was holding the camera, and the 'coon disappeared. We learned then that light, even the white blaze of a flash bulb, will not startle a wild creature as much as the slightest sound of a human voice. We were amused to see the raccoon nibble for a few minutes, holding the morsel of fish daintily in its forepaws, then slip silently down from the table. Presently the animal's head would show above the edge of the table, and it would pick up another fish. We decided the mustard sauce in which the sardines had been canned was a bit hot for raccoon taste, making a trip to the creek for water necessary. It must have been the thirstiest raccoon in the park that night, for our guest polished the can until it shone.

Black bears are fairly numerous in the park, but are seldom seen in the daytime. They stay deep in the unfrequented sections, coming out after dark to forage. One of the most likely places to see bears is at the large refuse dump near the Old Ox Road. We went there several times at dusk to watch for them. Unfortunately for us, a number of other visitors



Among the older trees in Cook Forest there are specimens that were flourishing before the early white settlers came to America.



The Park is bounded on the east by the Clarion River, which, from some of the area's high points, looks like a silver ribbon in the valley below.

had the same idea, and the sound of human voices, and the smell of human scent, kept the shy creatures back in the underbrush. We could hear the grunts and squeals of the cubs in the gully beyond the dump, but none ventured forth. The actual sight of these furry tenants of Cook Forest remains as another adventure for us to anticipate.

Deer are bolder and walk unafraid within a few yards of a person standing perfectly still. We were delighted and charmed by a half-grown doe, who met us on the Clarion River road and actually came up to us, rubbing her nose on our shoulders and bumping us with her head. It was an odd experience to have difficulty taking pictures of a deer because she was too close! Each time my son raised the camera, she came bounding over, sticking her muzzle fairly into the lens. At first, we thought she must be a pet, but we learned later it was not at all unusual for a deer to make such overtures. The wild creatures have been protected so long here that they have nearly lost fear of man. Perhaps it is just as well the bears are shyer!

The smaller creatures people the forest in great numbers. Black, red and gray squirrel scolded from every side as we walked along the trails. Raccoons raided the garbage can that hung outside our cabin. Flashes of black and white in the undergrowth revealed skunks; but, unmolested, they slipped away. We saw several non-poisonous snakes, among them the beautifully marked red king snake. So often this harmless and innocent reptile is destroyed by those who wrongly identify it with the dangerous copperhead! There are timber rattlesnakes and copperheads here, but they must be few, for over the years and along the miles we have traveled in the Park, we have never seen any.

Last year, we returned to the park at the time of the



This sign not only urges care in the use of fire, but also calls to the attention of visitors the long-term damage done by severe forest fires.

flowering of the laurel and rhododendron. During the latter part of June, and early July, the hills blossom forth in a pink-and-white panorama of color. Every trail is bordered with great clumps of pale, cuplike laurel flowerets, and creamy rhododendron. The birds are there in greatest numbers at that time of year, and more than ninety species make their homes in the forest during the summer months. While they are not seen often in the deep woods, their voices may be heard in the high, green canopy overhead. The liquid-throated thrush ripples a song through the heavy underbrush in early evening, and the red-winged blackbird calls shrilly to its mate swinging in the reeds by the river. In the grove of birches across from our cabin, we discovered the neat hanging nest of a solitary vireo. On close examination, we saw the tiny, blue-headed singer peering over the edge of the nest, her bright eyes watching our every movement intently.

No matter what the season of the year, the Park has its particular beauty to offer. Spring brings a soft green fringe along the creek banks where the willows bend, and the tips of the spruce boughs are pale and delicate against the dark older growth. Summer covers the hills and valleys with full-leaved bracken, ferns, and hundreds of wild flower species, for the soil is rich and sandy. October kindles flame along the Clarion, as the maples feel the brush of frost, and towering oaks flaunt wine-red leaves in the crisp air. When winter mantles the ridges with cloaks of snow, the great trees stand in dormant quiet, waiting for the quickening warmth of April thaw. Long before William Penn claimed these woods as his own, this noble forest of hemlock and pine was reaching for the sun; and for all time it will be preserved, with its wildlife, to delight the generations yet to come.



Snakes

By E. LAURENCE PALMER

This is the ninety-second in NATURE MAGAZINE's series of educational inserts.

Illustrations by Hope Sawyer and C. M. Reilly, Jr.

NO DOUBT many of us are prejudiced against snakes by the fact that they are rarely mentioned favorably in *The Bible*. Snakes appear often in Holy Writ, from Genesis to Revelations, but, for the most part, serpents are given a bad reputation, although in John III we are told that Moses lifted up a serpent and "so must the Son of Man be lifted up." Leviticus tells us that we shall not eat serpents. However, you can buy canned rattlesnakes in some markets where bizarre foods are for sale, and the United States Naval Institute's official book on survival advises that although some snakes have poisonous bites they are all edible, and some land and fresh-water snakes are "delicious."

One of the contestants on television's \$64,000 Question stayed in the race by remembering that *The Bible* does mention, as one of four things that are "wonderful" in Nature, "the way of a serpent on a rock." The others were the way of an eagle in the air, of a ship in the midst of the sea, and of a man with a maid. This is in Proverbs XXX 19, and can be accepted as evidence that there have long been those who get some satisfaction from watching snakes. If a snake can give pleasure equal to that provided by eagles, ships and maids, those who throughout their lives find only disgust in snakes are really missing something. Kipling must have liked the reference so well that he could not resist lifting and using it.

Shakespeare, in *Julius Caesar*, Act II, Scene I, prefers to build on prejudice against snakes by saying of an enemy;

"Think him as a serpent's egg
Which, hatch'd, would as his
kind, grow mischievous,
And kill him in the shell."

Incidentally, in connection with this reference, we should hardly want to accept the Bard as a teacher of herpetology when we remember that none of our egg-laying serpents

is dangerous. They may sneak mischievously around the house or fields, killing a few rats and mice, but surely we can forgive them for that.

Most of us have said now and then that we do not like to be stung twice. How many recognize that this saying goes back to Shakespeare, who in *The Merchant of Venice*, Act IV, Scene I, tells us "What, would'st thou have a serpent sting thee twice?" Fortunately, this leaves it to us to decide just what the antecedent of his serpent may really be.

We should like to go on in this vein but there is so much of truth to be told about snakes that we must change our approach. One last mischievously quoted reference is from a poet who said; "In the beginning, Allah took a rose, a lily, a dove, a serpent, a little honey, a Dead Sea apple and a handful of clay. When he looked at the amalgam—it was a woman." You may write your own interpretation as to whether the serpent was considered good or bad.

Now just what are snakes? According to zoologists, they are members of the suborder Serpentes, vertebrate animals ordinarily with no legs, feet, ear openings, sternums, or urinary bladders. Their eyes are not movable and are covered with transparent scales rather than with lids. The tongues are forked, extendable and slender, and used largely as sensory organs. In most, the left lung is greatly reduced and the teeth are mostly on the jaws and on the roof of the mouth. In the poisonous snakes, these teeth may be hollow and attached to venom sacs; may be fixed or movable. The jaws are so hinged that the snakes can swallow what would seem to be abnormally large prey. There are about 1700 known kinds of snakes.

Snakes move by rhythmic movements of their bodies, possibly assisted by their ribs. Some, like the sidewinders, move by a series of



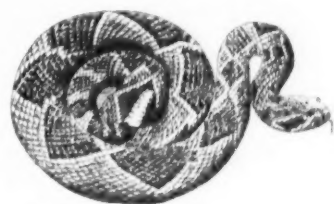
Lined Snake



Bull Snake



Copperhead



Diamondback Rattlesnake



Sidewinder

leaps. Normally a snake has, as its final act of defense or food-getting, a quick "strike" with the head, brought about by a sudden straightening of the body from a flexed position. Usually such a strike cannot exceed the length of the body, even if it should equal it.

Snakes sense their environment variously. They can see, but when they are about to shed their skin their sight is impaired by the opaque nature of the scales over the eyes. At such times they may strike blindly and nervously, much as we probably would do under similar circumstances. We know that snakes use the sense of scent to bring the sexes together, and this probably means that they use it for other purposes as well. Some snakes, like the pit vipers and including the rattlesnakes and copperheads, are sensitive, through these pits, to infra-red rays. Because of this, they can detect the presence of warm-blooded objects in regions of total darkness. This is a most valuable gift to an animal that may hunt at night or in holes under cover.

The bodies of snakes are covered with scales. These are of importance in their classification. Possibly the most importance attaches to the scales on the top of the head, on the jaw margins and to the number of scales (caudals) to the rear of the vent beneath, and the number of scales (ventrals) in front of the vent and on the under side of the body. Important, also, is whether the plate to the rear of the vent is divided or entire. Another character considered significant is the number of rows of scales and whether the scales are smooth or keeled (ridged).

When a snake sheds its skin, the process begins at the head. The animal pushes the skin off against some obstruction and removes it much as we might remove a stocking. When the skin is freshly moulted the snake usually appears to be more brightly colored than before. Lord Byron once used the simile "casts off his bright skin yearly like the snake." In this he was wrong because the snake may shed its skin much more frequently than that. When born, rattlesnakes have a button at the tip of the tail. When the skin is shed, the button retains a portion of the button of the old skin. This may be continued indefinitely. However, one cannot determine the age of a snake by counting the rattles since the skin may be shed more than once a year and the rattles may break off with age. The shed skins are often found in various places in Nature. Interestingly enough, the crested flycatcher seems to like to line its nest with such skins. Some large snakes have been known to live for forty years.

Snakes eat nothing but animal matter, and this is almost invariably taken alive. Capture may be by stalking or by quick pursuit. The victim is held by the snake's jaws, paralyzed by the venom, if present, or held by the constricting or binding coils of the snake's body. Usually, the animal is eaten alive, and once the prey starts down the reptile's throat it cannot easily be ejected because of the backward-pointing teeth.

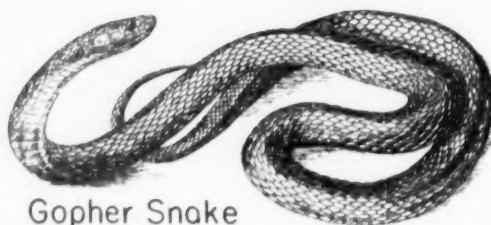
Snakes have limited food preference, some favoring warm-blooded animals while others may feed on fishes,



Ringnecked Snake



Horn Snake



Gopher Snake



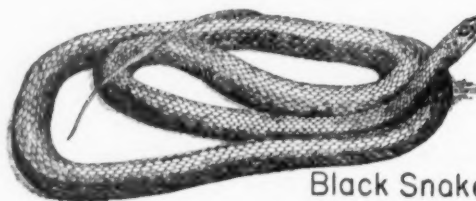
Cottonmouth



Coral Snake



Whip Snake



Black Snake

reptiles, amphibians or invertebrates. According to man's interest, the economic importance of a snake may be determined by its food preferences. Too frequently, man's judgment of snakes is not based on carefully examined data. Men avidly kill milk snakes because the animals strike readily and are believed to milk cows. They could not milk cows if they wanted to do so. Rumor has it that when a milk snake is killed its mate will return to wreak vengeance, and that if the killed mate is found the snake will be warned away. Of course, there is no basis for this assumption. Yet milk snakes suffer at the hands of most men. Garter snakes, whose food is largely useful earthworms, and frogs and toads, somehow do not seem to be resented so much as are the useful milk snakes. Before passing judgment on a snake try to learn from observation, from the accompanying table, or from reliable references just what its food habits may be. Then act accordingly.

Snakes reproduce much like other vertebrates. In some species males show great rivalry with other males, sometimes fighting vigorously. In other cases, there seems to be no competition for the favor of the female. In some cases, many males may attempt to mate at one time with one female, the whole group rolling itself into a ball in the act.

Actual copulation may last for but a short time, or may last for hours, as shown by our tables. In some cases, the sperm from one copulation may remain virile in a female for some years.

Snakes may reproduce by laying eggs, which have a rather long incubation period after they leave the mother. In other cases an egg may be laid only to have it hatch promptly. In still another category we have snakes giving birth to living young. These snakes may provide the basis for the fallacy that snakes protect their young by swallowing them. It is true that snakes may swallow other snakes, but not as a means of parental protection. Some snakes favor other snakes as their food. Young snakes are on their own from the first so far as food-getting is concerned. Parental care apparently is not considered as essential in a snake's family life.

Snakes may be found mating somewhere at almost any time of the year. Many of them mate immediately after they come from hibernation; others mate before they take the winter rest.

Since snakes are cold-blooded animals, and their body temperature approximates that of their environment, seasonal temperatures are of importance. Garter snakes may survive at temperatures between 28.4°F. and 105.8°F. Water snakes may survive between 32°F. and 109.4°F. The mythical "snow snake," supposed to have blue eyes and fur on the end of its tail is, of course, the figment of someone's imagination.

Some snakes, like the pythons, may reach a length of twenty-nine feet; others reach complete maturity when a few inches long. Snakes are found in trees, on the ground, in the water, or underground. None flies and none lives in fire.

Many snakes, like the gopher snakes and milk snakes, are most valuable to man.

Others are really dangerous. In the chart section the last six species considered are poisonous, and the nature of their poison is discussed in the tables. Suffice it to say there is nothing funny or smart in handling a poisonous snake. Statistically there is relatively little danger in death coming to a mature, healthy human from the bite of the average poisonous snake. But statistics mean nothing to a person suffering the pain resulting from such a bite, and since bites usually reduce one's resistance to other infections it is difficult to see why anyone, either just to be smart or to demonstrate some religious faith, should expose himself to the bite of a dangerous poisonous snake.

It is a fallacy to assume that a bitten person can be helped by drinking alcoholic stimulants. In fact, such a remedy may be the worst possible thing to do. Anyone likely to be where he may be bitten by a poisonous snake should provide himself with protective clothing, should carry a snake bite emergency kit—and know how to use it—and should get to a competent doctor, if this is possible and is necessary.

There is a wealth of excellent literature (continued on page 368)



DeKay's Snake



Ribbon Snake



Milk Snake



Corn Snake



Rubber Boa



Pigmy Rattlesnake

| COMMON NAME SCIENTIFIC NAME | RUBBER BOA <i>Charina bottae</i> | BLACK SNAKE <i>Coluber constrictor</i> | RING-NECKED SNAKE <i>Diadophis punctatus</i> | INDIGO SNAKE GOPHER SNAKE <i>Drymarchon corais</i> |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DESCRIPTION | Length to 28 inches. Tail blunt, making animal seem to have a head at each end. Color usually uniform and without pattern. Eye touches upper margin of row of scales immediately above mouth. Scales on top of head relatively large and a large dorsal plate on head. Scales with a sheen. Back dark green. Sides olive. Belly yellow. | Length to 6½ feet. Body slender. Head long. No paired shields between nostrils. No pit behind nostrils. Anal plate divided. Dorsal scales smooth and glossy, not silky black. Chin, throat and neck white in adults and without pattern above. Whitish below, or to medium gray or dark gray; unmarked. | Length to 18 inches. No pit behind nostril. Paired shields between nostrils. Anal plate divided. Dorsal scales smooth. Scales in 15 rows. Back dark-olive to olive-gray. Conspicuous yellow to orange ring around neck. Chin and upper lips cream or yellow. Belly reddish-orange. Eyes orange, with black iris. Albino forms are known. | Length to 8½ feet. No pit behind nostrils. Paired shields between nostrils. Smooth scales. 17 rows of somewhat oblique scales. Anal plate not divided. Head not distinct from neck. Tail 1/6 to 1/8 total length. 7 or 8 scales along one side of upper jaw; 8 along the lower. Ventrals 182-217. Caudals 55-88. |
| RANGE AND RELATIONSHIP | Suborder Serpentes. Family Boidae. <i>Charina</i> in 3 subspecies ranges from southwestern British Columbia to south-west California and east to Montana, western Wyoming, Utah and Nevada. Found usually in cone-bearing tree areas. Related <i>Lichanura</i> or rosy boa has body pattern, less blunt tail, no large plate on top of head, sharper snout. | Suborder Serpentes. Family Colubridae. This species from Nova Scotia to central New York and Ohio, and west to Mississippi River. At least 6 recognized subspecies. Blue racer, <i>flavescens</i> , with yellow belly. Florida black snake, <i>priapus</i> , with dark gray belly and yellow eye, with red; other subspecies to west. | Suborder Serpentes. Family Colubridae. In eastern ring-necked snake, <i>D. punctatus</i> , color of under parts does not extend to dorsal scales. In the 2 western species, ventral color extends to lower rows of dorsal scales. In western <i>D. amabilis</i> , there are under 206 ventral plates in males and under 220 in females. More in <i>D. regalis</i> . | Suborder Serpentes. Family Colubridae. Genus represented in United States by 2 subspecies; the Mexican <i>erebennus</i> found in southern tip of Texas and on into Mexico, and the common or Couper's, <i>couperi</i> , of the Gulf Coast, from eastern Louisiana to northern South Carolina. Mexican has 182 or more ventrals; Couper's under 184. |
| REPRODUCTION | Male may show two anal spurs that are rudimentary legs. Young, up to 8, born free of egg, in late fall or early spring, reddish-brown, to 8 inches long. Young quickly independent. Female may appear large with eggs by June. As primitive snakes have two well developed lungs as contrasted with the usual one large and one small lung. | Immediately after hibernation may congregate in ball with to 80 snakes in a group. With May mating, to 40 leathery, granular eggs may be laid, not fastened together, about 1 x 2 inches. In 1 to 2 months young hatch, 8-13 inches long, light gray with dark blotches or spots, which last to 2 years. May live to 5 years. | In June and July, 1 to 6 leathery, creamy yellow eggs, 1/3 by 1 1/3 inches in size, are laid in a nest in soft plant material. Several females may use same nest, making a total to nearly 50. Eggs hatch in 56 to 70 days into most active young about 5 inches long. Larger eggs are commonly from larger females and large eggs are likely to be narrow. | May engage in pre-mating antics. May include caresses, biting and entwining. Sperm may remain virile in female at least 4 years. May lay 5 or more eggs, each to 4 inches long and to 1¼-inch through. Young may be to 2 feet long and become quickly independent. Eggs may be buried in trash. |
| ECOLOGY | Found mostly in moist environment. Can burrow in loose earth, climb trees, swim. May strike with tail as though it were a head. Largely nocturnal. Food, small mammals, birds, cold-blooded vertebrates. May stalk mice open-mouthed and kills by constriction. Never bites or resents handling, even when first caught. Gentle. | Young may eat insects such as crickets, moths and grasshoppers. Adults eat birds, eggs, reptiles, toads, frogs and small mammals. Food may be held down by body, but is not killed by constriction despite the implication of the specific name. When cornered may attack man, particularly during breeding season. | Food includes insects, toads, earthworms, frogs, snakes, lizards and salamanders. Usually active from mid-April to mid-October, spending most of time under cover and being most active at night. Found most frequently under bark or stones, or in rotten logs or sawdust piles, usually in moist situations in wooded areas or woodland margins. | Food includes mice, rats, frogs, toads, snakes, including rattlers, birds and turtle eggs. Lives almost wholly on the ground and commonly near settlements. Its movements may be surprisingly rapid, but it is normally gentle when handled. Because of its environment it may remain active most of the year. |
| ECONOMY | Obviously useful as destroyers of mice. Makes excellent pet but does not thrive in captivity. Activity mostly from April through October. May roll self into a ball with head inside and tail outside, or, if held, may wind self around the arm. Related to the well-known boa constrictor but much smaller. Most boas are tropical. | Is harmless and not poisonous. May make a good pet after adjustment to confinement has been made. May serve as destroyer of harmful insects and other small animals, including snakes, but may be unpopular as a raider of the nests of birds, particularly those that use holes in trees and nest-boxes. | Obviously a harmless snake. Makes an interesting pet but may give off foul discharge when first captured. Some subspecies have tendency to wind the tail around a restraining hand. Ring on neck may sometimes be inconspicuous. May serve a useful purpose as destroyer of insects and of some other snakes, but is generally neutral in service to man. | This is a common circus animal, popular because of its size and beauty and because of its docility. It is a most useful wild animal, destroying large numbers of harmful rodents. Common names of indigo and gopher snakes are sometimes applied to other snakes of other genera. |

| RAT SNAKE. CORN SNAKE. <i>Elaphe guttata</i> | HORN SNAKE MUD SNAKE <i>Farancia abacura</i> | MILK SNAKE <i>Lampropeltis dolia</i> | WHIP SNAKE <i>Masticophis flagellum</i> | BULL SNAKE <i>Pituophis catenifer</i> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Length to 6 feet. No pit behind nostril. Paired shields between nostrils. Dorsal scales keeled feebly on back and smooth on sides. Anal plate divided. Large, richly colored snake bearing 40 or less red-brown blotches narrowly edged in black over orange, light red or gray. Two rows of smaller blotches on sides. | Length to 7 feet but mature at 20 inches. No pit behind nostril. Smooth dorsal scales. Divided anal plate. Single or double shield between nostrils. 19 rows of scales at mid-body. Tail short and ending in horny spine. Head and neck not distinct. 6 to 8 scales along one upper jaw and 8-10 along lower. Ventrals 168-208. | Length to 4½ feet. No pit behind nostrils. Paired shields between nostrils. Smooth dorsal scales. 9-11 scales on edge of lower jaw; 7 along edge of upper jaw. Anal plate not split. No red on snout. With three colors, with red rings, or with red or brown saddles. Gray, brown, olive-chestnut or red saddles are black-edged. | Length to 8½ feet. Scales smooth. Anal plate divided. Head and neck defined. Head sometimes black. Ventrals 183-214 as contrasted with 151-192 in <i>Coluber</i> . Caudals 94-160 as contrasted with 72-120 in <i>Coluber</i> . Upper labial scales 8 as contrasted with 7 in <i>Coluber</i> . Extremely long, slender tail. Little color pattern. | Length to 8½ feet, with reported 10-foot lengths. 8-foot snake may have 8½ inch circumference. No pit behind nostril. Paired shields between nostrils. Keeled dorsal scales. Anal plate not split. Head slightly wider than neck. In foreparts, scales in 25-35 rows. Subcaudal scales average 223 in males and 227 in females. |
| Suborder Serpentes. Family Colubridae. Genus includes about 10 species found in United States. The back usually bears black H's on gray or pale brown, with 2 neck stripes and no head markings. Includes in genus pilot black snake, <i>E. obsoleta</i> , one of the largest eastern snakes with faintly keeled, highly polished scales. | Suborder Serpentes. Family Colubridae. One species and 2 subspecies in United States. In western (Florida-Texas-Indiana-Tennessee) ventral color not on sides. In eastern (Florida-Alabama-eastern Virginia) color does extend up to sides, with light side bars separated by 3-4 scales as against 8-9 in western. | Suborder Serpentes. Family Colubridae. 8 species in United States and 8 subspecies of <i>dolia</i> . <i>L. dolia triangularis</i> ranges from Nova Scotia to Florida and west to the Mississippi. In other subspecies, ranges west to the Pacific. Often found under stones and in old stumps, or in houses and barns. Favors under-bark areas. | Suborder Serpentes. Family Colubridae. One species, <i>flagellum</i> , east of the Mississippi, Nebraska and western Oklahoma and Texas and 14 west of that area, with only 1 of these found north of northern California to Kansas for most part. Essentially a genus of the Southwest. Practically unknown north of Mason-Dixon. | Suborder Serpentes. Family Colubridae. Two species in genus in United States, the pine snake, <i>P. melanoleucus</i> , with under 41 dorsal spots, and <i>P. catenifer</i> , usually with over 50 dorsal spots. Usually bull snake is considered variety <i>sapi</i> , which has sharp snout, and the gopher snake as variety <i>catenifer</i> with a blunt snout. |
| Eggs may number to 24 and may be fastened together in clusters. Egg-laying may be from July through September. Related pilot black snake may be in copulation from 17 minutes to 6 hours. Eggs hatch August through October. One pilot black snake known to have lived 16 years. | Males may show keeled ridges on dorsal scales in anal region. Breeds in July and female may lay to 110 creamy white, parchment-covered nearly spherical eggs, 1 by 1 2/5 inches, buried in walls of cavity in which female may be found. Eggs do not adhere. May hatch from April to October, have light bands. Moults at 8 days. | In June or July, 5-16 eggs, to 4/5 by 2 inches, are laid in rotting plant material or manure piles, hatching from July to October into 6-10 inch snakes. Eggs are smooth, tough, opaque, leathery, sometimes adhering into one cluster. Young may be more brilliantly colored than adults. Known to live to at least 8 years 9 months. | Probably mating at height in April. In June, 8-24 granular eggs, about 2½ inches long and ¼ as thick, are laid underground sometimes to depth of more than 10 inches. Young are spotted like young black snakes, or with cross bands that are to 3 scales wide and separated by 1-2 scales. Has spectacular speed on the ground. | Breeds first at about 3 years of age in April or May, apparently brought together by scent. Eggs number 5-22, are to 2.7 by 1.7 inches, tough, leathery, rough, adherent and hatch in 64-71 days into 15-inch young that shed skins in 10 days and may not eat for 9 weeks to following spring. Known to live more than 4 years. |
| Remains active May through October. Is mostly nocturnal. Found mostly in dry fields and thickets. Climbs well. Kills by constriction. Hisses, strikes and vibrates when disturbed, but is wholly harmless to man. Mice are the favored food and these are caught in houses, haymows, sewers, abandoned pipelines. Hibernates. | Feeds on salamanders, earthworms, congo eels, frogs and fishes found in moist or wet environment in which it burrows freely. Nocturnal largely. Found in fresh water or salt-water marshlands or bogs. Normal color of back a glossy, metallic, enamel-like black or blue-gray. Belly coral-pink or red, with bars on sides. | Food largely mice and rats, snakes and their eggs, birds and their eggs but never milk cows or seek milk. Haunts human dwellings in search of the mice and rats that are there. May eat insects, particularly when young, and may eat salamanders, frogs, toads and lizards, but seems to favor warm blooded animals. | Food is largely rodents, snakes, lizards and birds captured in part by exceptional speed. The typical eastern whip-snakes are dark brown to black forward and much lighter to the rear, with no conspicuous stripes or bands. Scales often conspicuously defined with dark. Scales are in 11, 12 and 13 rows at anus contrasting with 15 in <i>Coluber</i> . | Food mostly gophers, mice and rabbits killed by constriction and eaten whole. May eat eggs whole only to crush them at esophagus. Hiss may be heard at 50 yards. When surprised may form a frightening pose ready to strike, and disposition of snakes varies greatly with individuals from aggressive to gentle passive animals. |
| Highly useful destroyer of mice and similar vermin. Has been called America's most beautiful snake. Not so popular as indigo snake as a pet, as it easily gives off offensive odors and discharges. May be found in hibernation in cisterns, rock walls and under concrete floors where openings may be found. | Is probably of a neutral economic importance but is completely harmless and gentle as a pet. Known as stinging snake, possibly because of harmless horn at end of tail. Also known as thunder snake, rainbow snake, hoop snake and red-bellied horn snake. Not too common, ordinarily. | Probably one of the most valuable snakes of its natural habitat and most misunderstood. May strike when cornered or surprised but quickly becomes adjusted to handling and makes clean, gentle popular pet. Is entirely harmless and non-poisonous, although when it bites it may chew ineffectively. | Undoubtedly a useful species, preying on destructive rodents for the most part. An interesting and exciting pet due to ability to escape. I have made a dive for the head of 5-foot snake and just managed to catch the tip of the tail even when my physical reactions were at their best. Of course is non-poisonous. May tear flesh. | This snake should never be killed as its value is great, an individual being worth at least 20 dollars alive as a destroyer of mammal enemies of valuable agricultural crops. Can easily rid a barn or house of rats and mice, as well as work in the fields, particularly in grain shocks where mice feed on grain and the snakes on mice. |

| COMMON NAME SCIENTIFIC NAME | BROWN SNAKE DEKAY'S SNAKE <i>Storeria dekayi</i> | RIBBON SNAKE <i>Thamnophis sauritus</i> | LINED SNAKE <i>Tropidoclonion lineatum</i> | CORAL SNAKE <i>Micrurus fulvius</i> |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DESCRIPTION | No pit behind nostril. Paired shields between nostrils. Anal plate divided. Dorsal scale keeled. Scales in 17 rows that are keeled. Maximum length to 19 inches. Slender, with short tail. 35 caudals in females and 69 in males. There is a dim, rather broad, light stripe down the back, a dark spot below each eye and whitish or pinkish underside. | Length to 3 feet. No pits behind nostrils. Paired shields between nostrils. Dorsal scales keeled. Anal plate undivided. Scales in 19 rows. Glossy black with conspicuous yellow or brown lateral stripes on 3rd and 4th rows of scales. Tail 1/3 or more of total length. Small light spots in middle rear of head. Lips not barred. | Length to 20 inches of which 1/3 is tail. No pit beyond nostrils. Paired shields between nostrils. Anal plate not divided. Dorsal scales keeled except in outer 1 or 2 rows. 17 rows of scales in forward third of body; 17-19 at mid-body and 15-17 at anus. Two rows of black spots down middle of otherwise plain belly is distinctive. | Length to 43 inches. Slender. No pit behind nostrils. Anal plate divided. Scales smooth. Ventral plates over 200. Fixed grooved fangs in front of upper jaw. Eyes small. Tip of head to behind eye black. The yellow band backed by broad black band. Body ringed with red, yellow, black and yellow, with yellow narrower than others. |
| RANGE AND RELATIONSHIP | Suborder Serpentes. Family Colubridae. There are 2 species in the genus in the United States, the red-bellied snake, <i>S. occipito-maculata</i> , with 15 rows of body scales and the DeKay's snake, <i>S. dekayi</i> , with 4 of the 5 subspecies with 17 rows of body scales instead of the 15. They range in one or another subspecies through all of eastern United States. | Suborder Serpentes. Family Colubridae. Genus represented in United States by at least 10 species and many subspecies, which, in one form or another, are to be found practically throughout the country. Ribbon snake <i>T. sauritus</i> , is found in one or more subspecies through area east of line from Texas and central New Mexico to central Wisconsin. | Suborder Serpentes. Family Colubridae. But one species in the genus in the United States and this limited to plains areas of Texas, Oklahoma, Colorado, Kansas, eastern Nebraska, southwest Iowa, western Illinois, Missouri and northwest Arkansas with a few in extreme southwest Minnesota and southeast South Dakota. | Suborder Serpentes. Family Elapidae. There are two genera, <i>Micruroides</i> , which is black from tip of head to angle of mouth, and <i>Micrurus</i> , which is black from tip of head to behind eye; then with a yellow band. But 1 species in the genus and 3 subspecies in the species. Confined mostly to southern border and to North Carolina. |
| REPRODUCTION | Apparently no courtship procedure and little rivalry among males. Pairs mating in mid-April and may continue into fall. Young, from 3-24 and 3 1/4 to 4 1/4 inches long, may be born 105-113 days after mating but may vary from this. Red-bellied snake has similar reproductive habits, but may be smaller in number and size. Young commonly darker than adults. | Mates probably in spring and in July and August. From 5 to 20 young are born, these being usually fewer in number than in the closely related garter snakes. At birth young may measure to nearly 10 inches and are independent from the first, of course. But one brood a year is probably the rule. | May mate in spring or through summer into the fall. May give birth to young in August in litters of 2-12, each snake to more than 4 inches long. Young may feed on earthworms when 3 days old and shed skin shortly after that age. May reach sexual maturity at 18 months or thereabouts. | Little is known about the breeding and reproductive habits. Apparently 3-12 elongate eggs are laid in early summer in damp soil or decaying bark. These hatch in mid-autumn into active young, to 9 inches long, which unlike adults, bite quickly if handled. Aside from this, relatively little is known about the species. |
| ECOLOGY | These snakes are relatively common in vacant lots under stones and boards. Food is commonly earthworms, slugs, snails, small amphibia and even fish. Animals frequently may be found in wooded areas near waterways, but are usually under loose surface debris. When disturbed may threaten to strike and give off offensive discharge from vent. | In captivity the food is frogs, fish, earthworms, salamanders and some insects, and this probably represents the food eaten when free. These snakes are most active in broad daylight; when pursued may retreat to the water like a water snake. On capture they may bite vigorously and expel vile substances from vent but soon tame. | Food includes insects, earthworms, sowbugs, but chiefly earthworms. Apparently they may feed day or night according to the records, but these are not too conclusive. These snakes rarely bite, but when captured try violently to escape and free abundance of offensive discharges from vent, as do the related garter snakes and water snakes. | Food is largely small snakes and lizards. These snakes have been found abroad in January on sunny days, but normally they hibernate. Coral snakes are generally sluggish and seldom bite but when they do they chew and hang on and their poison is altogether too effective. Behavior is most unpredictable so they should be highly respected. |
| ECONOMY | Essentially useful snakes, destroying such enemies of man's crops as insects, slugs, and snails. They are gentle pets that respond well and quickly to reasonable treatment and should be valuable in teaching those who fear snakes that this fear should not be extended to all species. They survive well in humid terraria if fed adequately. | Probably like the garter snakes these snakes with their appetite for useful earthworms and frogs cannot be listed as being of great economic value. However ribbon snakes are really beautiful animals and once adjusted to captivity make good pets that are easily maintained and probably good teachers of kindness to their captors. | Probably is of little economic importance but since it feeds so freely on useful earthworms the balance is against it. Careful studies have not been made to yield conclusive generalizations on its merit. Limited range is of some interest, as is the fact that there are few species and subspecies in the genus. | Venom causes local numbness and there does not seem to be an effective antiserum but the chances of recovery from a bite with little care are fair in contrast with the bite of other poisonous snakes of the common area. Venom like that of cobras and South American rattlers dissolves cell tissue and destroys or paralyzes nerves. |

| COPPERHEAD <i>Ancistrodon contortrix</i> | WATER MOCCASIN COTTONMOUTH <i>Ancistrodon piscivorus</i> | DIAMOND-BACK RATTLESNAKE <i>Crotalus atrox</i> | SIDEWINDER HORNED RATTLER <i>Crotalus cerastes</i> | PIGMY RATTLER GROUND RATTLER <i>Sistrurus catenatus</i> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Length to 40 inches. Diameter to 1½ inches. With pit on either side of head behind nostril. No rattle at end of tail. 9 large symmetrical plates on head. Relatively slender. Head enlarged. Hazel brown with chestnut brown blotches that are narrowed in middle like an hour-glass, unlike wide-middled watersnake blotches. | Length to 6 feet. Circumference to 10 inches. Color pattern obscure; olive with wide dark crossbands in this species. Usually 25 rows of scales all large and distinct particularly on sides. Back brownish olive, sometimes being black and sometimes with some 28 dark bars. Open mouth may appear white inside. | Length to 8½ feet. Pit behind the nostril. Rattle at end of tail. Tail, short and stocky. Body stocky. Scales keeled in rows 1 to 5 and smooth in rows 21-31 as in all rattlesnakes. Dark and light rings of tail about equal in width but both colors contrasting with adjacent body color. Pupil vertical. Head easily defined from neck. | Length to 2½ feet. With pit behind nostril. With horn-like projections above eyes. Basal unit of rattle is brown. Scales usually in 21 rows. Ventral plates in males 141 or less; in females, under 144. Dorsal scales strongly keeled. Gray, tan, pink, or brown with row of faint yellow-brown back blotches. | Length to 40 inches. With pit behind nostril and rattles at end of tail. Top of head covered with few large scales as contrasted with many small scales as in <i>Crotalus</i> , the rattlesnakes. 9 plates on top of head in <i>Sistrurus</i> . Dorsal scales usually in 25 rows at middle of body and for most part strongly keeled except outermost. |
| Suborder Serpentes. Family Crotalidae. In same genus with water moccasin, which is more stockily built, and with less distinct markings and different habitat. Four subspecies recognized in the species. Ranges from Massachusetts to northern Florida and west to Illinois, Arkansas and Texas. In North found in woods and fields on dry ground. | Suborder Serpentes. Family Crotalidae. Two subspecies of the species one ranging from southeastern Alabama to southeastern Virginia and the other ranging from Illinois to the Rio Grande south through most of Mississippi, Louisiana and southeastern half of Texas. Found in swamps and sluggish waterways near woodlands. | Suborder Serpentes. Family Crotalidae. Some 17 species in the United States. This species characterized by brown diamonds on back over ground color of cream, buff, gray or reddish. This species found in United States in Kansas, Arkansas, Oklahoma, Texas, Arizona, California and possibly in Colorado. No subspecies listed. | Suborder Serpentes. Family Crotalidae. This species with limited distribution in area where Nevada, California and Arizona meet. Three subspecies recognized. <i>C. c. cerastes</i> , <i>C. c. lateralis</i> , and <i>C. c. cerco-bombus</i> . The species is of course closely related to the other rattlesnakes and with many of them have common character. Unlike others, female is the larger. | Suborder Serpentes. Family Crotalidae. 3 species recognized in genus, of which one, <i>ravus</i> , is found on southern part of Mexican Plateau. Two subspecies of <i>S. catenatus</i> , <i>S. c. catenatus</i> ranging from New York and Ontario and Pennsylvania to northeastern Kansas and southeastern Nebraska; <i>S. c. tergeminus</i> on s. w. to n. Mexico. |
| Breeds in March and April. Young numbering 2-11 born in September or late summer, the young being to 9 inches long, being born in a sac that is semi-transparent and from which the young frees itself in a few minutes. Young are active, have green tail tips which they vibrate rapidly when annoyed. They strike freely. Shed first day. | May breed in April and May and in the autumn. Incubation period about 5 months. One brood a year. 3-15 young each of which may be about 1 foot long and born most commonly in August and September. There is a courtship behavior involving combats between males according to some authorities but also questioned. | Males engage in "courtship" dance. Mating may take place mostly in spring but also in fall or winter. From 4-25 young are born alive ranging in size from 9-13 inches, born in late summer or fall and are active immediately. Hibernates in den or hole in ground in cool weather. One gestation record of 5 months and 16 days. | Mating may take place in fall but is more common in spring. It is often preceded by fights between males, ending in mutual biting, commonly in neck region. Young numbering 5-16 are born in the fall from September through November. Young are to 8 inches long. Hibernation and rest may be in underground den. | Matings probably take place in May and young numbering 5-14 and to 11 inches long may be born in August and September. They quickly become independent. End of tail of newly born snake is white to yellow and may have a thin yellowish shell. At first is a button, but with each moult a new segment to rattle is added. |
| Food is small rodents, birds and frogs. Normally does not attack and rarely takes offensive but should never be taken for granted as a bite may be serious and to children under 8 may be fatal if from a snake as large as 30 inches long. Snakes reach maturity at 3-4 years. Hibernation may follow birth of the year's litter. | Food is frogs, fish, salamanders, reptiles, birds and mammals. In captivity snakes may bite each other and result may be death to the bitten animal. Number of fatalities to human beings is surprisingly small, with a high record for one year being 16 over a decade. A 5-foot animal may yield 3½ cc. of venom on first bite. | Food mostly rodents and birds, possibly detected in dark by infrared receptor in the facial pit which could locate warm blooded animal in darkness. Venom is injected through large movable fangs, which are extended when snake strikes from coiled position. Snakes may poison themselves by biting, or may poison other rattlers by biting. | Food is lizards, rodents and insects. Vicious temperament and aggressive behavior. Moves laterally leaving a series of parallel S tracks. Snake seems to jump in leaps of 3 to 6 inches. Can change color remarkably with changing temperature. Can be tracked to night burrow and usually found near entrance in morning. | Food is rodents, frogs, toads, birds, insects, fishes and other small animals. The animals are found often in bogs and brush covered or tall-grass lands. Most commonly found where sedges and marsh grass is cut for use as coarse bedding. Rattle is too faint to be heard by most folks. |
| Venom aggravates internal bleeding by preventing coagulation of blood and destroys animal tissue. Symptoms are pain, swelling, sweat, nausea, shock, sometimes bloody stools. Normally there is a good chance of recovery in an adult, but known antivenoms are available and effective in helping recovery. | Venom is like that of copperhead but with more severe effects. It prevents blood clotting and of course aggravates bleeding. Under normal conditions a reasonably healthy person has a good chance at recovery with little treatment but can be relieved of much suffering if the available suitable antivenom is used properly. | Venom destroys animal tissue and prevents blood from clotting and may greatly reduce ability of victim to combat general infections. Treatment should be by standard rattlesnake anti-serum and not by potassium permanganate or whiskey. Prognosis for recovery without treatment must be guarded. Possibly our most dangerous snake. | Speed is to 2 miles an hour. Can survive temperatures of 105.8°F. Becomes active in spring at 70°F., more tolerant of cold than <i>C. atrox</i> . Apparently most abundant April-mid June at 62-82°F. Primarily nocturnal. Venom like that of other rattlesnakes but not so abundant. Prognosis of recovery of uncared-for patient is fair. | Can coil quickly. New-born snakes may coil into circles 1½ inches across. Venom is like that of other rattlesnakes and the snakes must be respected as dangerous animals at all times. Probably more dangerous than larger relatives since the warning rattle is too difficult to hear although amount of venom is usually small. |

(Continued from page 363)

about snakes. In fact, this insert is given at this time because there seems to be an increase of excellent literature on the subject in recent months. In the following bibliography it should be noticed that within the last year books by Klauber, by the Wrights and by Kauffeld are but fresh off the presses. The book by Kauffeld is built on enthusiasm for snake-collecting. The book by the Wrights gives an excellent story of all the snakes to be found in the United States, with pictures of living snakes taken by the authors. The books by Klauber show how rich is our information about only one group of snakes. Six snakes were discussed in the fourth insert of this series. They are not here considered.

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Outdoor Advertising and Public Relations

An Editorial

IN SEPTEMBER, 1956, The Union Oil Company of California, which serves the States of Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah and Washington, cancelled all use of billboard advertising. The result of this action has been a twenty percent increase in patronage and a widespread expression of public approval.

"Two factors were of primary concern to the company in reaching the decision to abandon this type of advertising," say the company's official announcement. "First was the traffic hazard which a great many experts have indicated billboards tend to increase. Second is an apparent and growing resentment on the part of many people and residential communities to obscuring our natural beauties with this type of advertising.

"As a company serving the motoring needs of a general public, it did not make good sense for us to continue to use an advertising method which was apparently becoming offensive to many of our customers and prospects and which, in the opinion of some experts, represented a hazard to them."

In the light of this action, and the nationwide publicity that has resulted from Senate hearings on Federal legislation to restrict outdoor advertising along the 41,000 miles of the \$33 billion Interstate Highway System to be built during the next decade, those interested in protecting the highways from outdoor advertising invasion have sounded out the attitude of the largest users of outdoor advertising space. It has been called to the attention of those advertisers that seventy-five percent of the new highways will go through new and as yet unspoiled territory, and that the limited-access design of the highways excludes all other business use of the roadsides.

In view of this it has been suggested that these advertisers might well review their advertising in the light of good public relations, and in recognition of the distaste of the large majority of Americans for such roadside defacement. This sentiment is demonstrated in the findings of a recent Trendex poll, which showed that two out of three Americans are definitely opposed to rural outdoor advertising. Business executives have been urged to express their thinking in this matter.

While outdoor advertising users reveal no general tendency to jump on the Union Oil Company's bandwagon, they do indicate appreciable recognition of the sentiment against misplaced outdoor advertising. A good many executives insist that their billboard messages are confined to commercial and industrial areas, thus revealing a concern for the rural highway environment. Many of them extol the outdoor advertising medium as beneficial to the "health of the American economy," which, it seems, is supposed to cover a multitude of sins.

Others parrot the outdoor advertising industry's line that "regulations should be on a State and local level," an argument always advanced because the industry knows from long experience that it is easiest to thwart regulations at these levels. A few even indulge in encomium for the "beauty" of the billboard.

The president of Outdoor Advertising, Inc., the trade organization of the standardized outdoor advertising medium, reacted to any opposition to outdoor advertising by providing two most interesting sentences:

"I wonder if you will agree that freedom to communicate is basic to our society, and that freedom of speech—freedom to be heard—also implies freedom to be seen. The right to communicate visually in the outdoor area—in good taste and within the law—would seem to be one of our essential freedoms."

This syllogism attempts to postulate a new freedom—the freedom to intrude. It also arrogates to "good taste" a universal definiteness that O.A. does not, unfortunately, possess. And it is easy to remain within the law when you control that law!

The outdoor advertising medium, the industry contends, is subject to regulations in all of the States. In fact, such regulations vary from the infinitesimal to the too little at the State level, and from nothing at all to occasional good zoning at the local level. The outdoor advertising industry asserts that it, as a legitimate business, is entitled to participate along with other businesses in areas which have been zoned for business, commercial, or industrial purposes.

So far as the system of interstate highways is concerned, these are limited access highways, with all business excluded except from the vicinity of points of ingress and egress and roads feeding such interchanges. Thus the outdoor advertiser is seeking a unique privilege; is asking for an exclusive place on the environs of the new highways. It is not a question of the control of outdoor advertising but the control of the use of the highway, which includes its immediate environment. Are the outdoor advertising people, then, entitled to special consideration?

The answer to that is simple. When the "Outdoor Advertising Medium" actually and specifically confines its operations to areas which have been zoned for business, commercial or industrial purposes there will be some realistic basis for resolving the conflict between the industry and those concerned with roadside protection.

Such sounding of sentiment among advertisers and the outdoor advertising industry serves to strengthen our conviction that the only protection to the public, which is investing its billions in the new highway system, lies in Federal control of the parasitic growth of outdoor advertising along these highways. ♣ ♣ ♣



PHOTOGRAPH BY THE AUTHOR

This specimen of the pallid pocket gopher of California's Imperial Valley seems to be questioning the photographer's right to picture him. The long, curving claws and strong shoulders of the pocket gopher are well suited to earth-moving.

AT SOME TIME, far back in the history of life on earth, certain of the smaller mammals took to burrowing in the earth, first, probably, for a living, and then for self-protection. Of these mammals, the mole and the pocket gopher most fully typify this secluded way of life. The mole's bat cousins took over the realm of the air for their subsistence, and the gopher's distant relatives, the ground squirrels, have managed to exist in only partial retirement from the sun, and from association with other terrestrial creatures.

Speaking of ground squirrels, some species of these sun lovers of the prairies and plains masquerade quite widely under the name "gopher." This is particularly so of the little picket-pin squirrel that sits up in grotesque attitude to blink at the reviving sun of March. In the deep southeast of our country is an isolated group of gophers known locally as "salamanders," probably because they have survived the occasional fires in sedge and woods, where the less fortunate, like rabbits and squirrels, have perished. Such was the way with the fabled salamander. But, oddly enough, in these same southeastern localities, the name "gopher" is applied to a large burrowing turtle.

The pocket gopher is one hundred percent an American mammal, represented west of the Rocky Mountains by the genus *Thomomys*, the mound mouse, and east of the Rockies by the genus *Geomys*, the earth mouse. The western genus is distributed generally over southwestern Canada, western United States, and northern Mexico. The eastern genus is more commonly found on the prairies and the great plains, from Texas to Manitoba, including the mountain slopes. And there is also the southeastern

Meet the Pocket Gopher

By THEO. H. SCHEFFER



A group of disposal dumps of the Kansas Valley pocket gopher covers a half-acre near Manhattan, Kansas. Disposal dumps have been covered with lime, in order to increase contrast in photograph.

group occupying parts of Florida, Georgia, and Alabama.

The distribution of the pocket gopher is a story in itself. Being limited mainly to underground travel, the animals do not wander widely, and thus show the development of racial forms and adaptations through long periods of restraint by local barriers. Scientists recognize dozens of species, and a great many subspecies, or geographical races. Some of the barriers to distribution are in the soil itself; for these burrowing rodents prefer sandy or friable soils for their operations, rather than stony lands, wet lands, or those of gumbo composition. So, in a given region, there may be about as many races of gophers as there are isolated prairies or soil pockets. The mole may have the wet soils all to himself!

These two small mammals, most fully representing the secluded, burrowing life, therefore do not compete with each other in requirements of physical environment, nor do they in the matter of livelihood. The mole is a lively little beast of prey, traversing his underground hunting paths in almost constant search for living food. The pocket gopher, on the other hand, is a soil miner, cutting

roots, rhizomes, and bulbous forms of plant life for food, and storing them against the day of scarcity.

In its way of living, the mole keeps its underground runways open and in repair at all times; for the food items it seeks are on the move, too, and may be snared time and again, as insects in a spider's web. But the gopher's diggings yield but a single "deposit," and the mined-out stopes are packed, at convenience, with earth excavated from the fresh lodes. This may enlighten the gardener, who gazes ruefully at stems without roots or bulbs, but who has no clues to the culprit anywhere on the surface.

The gopher, at home, lives a solitary life, if a female, except at such times as the male invades her private burrows for springtime mating. Possibly the female goes half way in this courting; for I have repeatedly trapped a pair at the same spot in this season of the year. The female rears her brood of four to six young in a few weeks during April and May. She then leaves them to their own resources, which they are by that time quite capable of discovering.

The brood nest, as the living nest of both sexes, is a ball of shredded grasses eight to ten inches in diameter, sometimes as much as four or five feet deep in the ground. This is the usual pattern of reproductive life wherever I have worked with the several species in temperate climates. But in sub-tropical southern California, the case is different. There the pocket gopher apparently breeds every month in the year, with a percentage of pregnancy in the field at all times, which plainly indicates more than a single brood for each female in a calendar year.

The gopher shows itself as an opportunist, like some other species of small mammals, notably the wild mice. The introduction of alfalfa into southern California, for example, has changed the whole picture of gopher reproduction there. Where numbers of the species were naturally so scarce as to require considerable search for museum specimens, the growing of alfalfa later provided such optimum conditions for gophers that these pallid rodents of the former desert fairly swarmed over the landscape, necessitating measures for their control.

Perhaps we should indicate here a few points in the gopher's structure and adaptations to his ways of life. The eyes of the animal are quite small, yet functional in the twilight activities of pushing out earth from its excavations, or occasional nocturnal foraging. The fur is of a texture that repels moisture effectively. The tail is fairly stout, practically hairless, and pointed like a finger, to feel its way backwards when the mammal is progressing in that direction. For he moves



PHOTOGRAPH BY VICTOR B. SCHEFFER

On the Mimi prairies of southwestern Washington State, early investigators found mounds that they believed were the work of "pre-historic" pocket gophers. This view of more recent "Mimi" type mounds was taken south of Puget Sound, Washington; the heavier growth around the mounds has been likened by some to "hanging gardens."

forward or backward with equal ease, when storing food in his root cellars. The shoulders are strong, like a mole's, and the claws exceptionally long, for digging. The pouches, or pockets, from which the gopher gets his given name, are not a part of the mouth cavity, as are the cheek pockets of the chipmunk, but are nicely lined with fur. They are used for carrying food only.

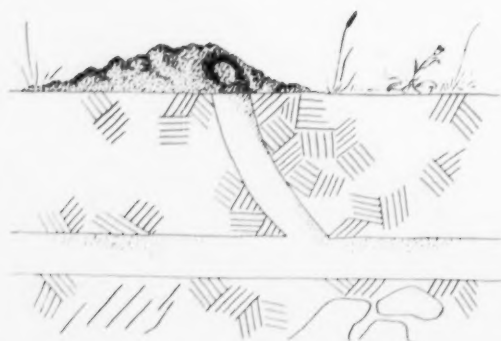
Neither the mole nor the gopher hibernates. When the ground is frozen at the surface, the mole burrows beneath the frostline. At such times, the gopher resorts to his food stores, or burrows wherever he can push his "drifts," even under a deep covering of snow.

There is an interesting contrast in the construction and use of the burrows of the mole and the gopher. The mole's runways are extensive and inter-connecting; they may be used by many individuals. The hills of excavated soil are built like a volcano, by materials forced up through the center. A gopher's tunnels, short or longer, are the private premises of the digger; and the excavated

earth is shoved out on the surface, as from the entrance to a hillside mine. The tunnels have storage pockets, here and there, for food supplies; and they are extended from time to time when "mined out." The mole likewise extends his burrow "hunting paths" at times. But there are no storage pockets, for a mole can not store up his prey. I have seen as many as seven earthworms "hunting cover" on the surface when a mole was disturbing the earth by new mound construction.



A busy little fellow is the pocket gopher. Here is three-fifths of a peck of sectioned alfalfa roots, from the storage chamber of one rodent.



To dispose of the earth he excavates, the gopher shoves it out by the armful at the exit of his tunnel. Sometimes he packs it into old, abandoned workings.

The matter of gopher excavations brings us to a recent appraisal of certain landscape features designated as "Mimi mounds," from their first-noted occurrence on the Mimi prairies of southwestern Washington. These

prairies are of glacial outwash origin, but other Mimi mound areas have since been noted on other terrain in several parts of our western gopher range. In most cases the mounds are low, more or less circular, and perhaps twenty to thirty feet in diameter. Early investigators are generally of the opinion that the Mimi mounds are creations of "pre-historic" pocket gophers. It is certain, at least, that these mounds are being worked by local species of present-day gophers, a mammalian parallel of the ancient civilizations on which man has now superimposed a new and modern pattern of social life.

Pocket gopher mounds of the dimensions of the Mimi mounds are not uncommon on wild prairies and cultivated fields. They may appear in an alfalfa field, following the last cutting in late summer, when the gophers are storing feverishly, and they may be spotted on the prairies by their low prominence and the more luxuriant growth of vegetation upon them. Through the accumulation of humus and enriched subsoil deposit, they have become the hanging gardens of the pocket gophers.

Litany of Light

By GILEAN DOUGLAS

Photograph by the Author

ALL THE sea world around me is asleep. Everything is gray and still, with sea and sky so entwined that it is difficult to distinguish one from another.

The light increases and soon tall peaks show gilded top-knots. The dawn wind sighs and small waves begin to tinkle on the shore. A loon calls from some hidden bay and a sea gull's cry hangs thin and sharp upon the air. A thrush whistles admiringly at the pretty summer day, and a robin chirps a lusty challenge to his rival. A fishing boat with poles up-raised runs slowly through the channel.

Light comes spilling down the mountains and a mist of amethyst rises up around them. The sky is no longer gray gauze but a solid blue that urges its color on the sea. A salmon arcs in silver spray and a great blue heron stands in one-footed meditation. There is a feeling of activity and awareness as I walk through the woods, although nothing is visible or heard. Perhaps it is only the quickening of my own blood, the lifting of my heart to this unfolding beauty. The night was hot and humid, but this morning is like diving into a cool lake. There is the same exultation, the same chill joy, the same glow afterwards. If there were no torrid nights there could not be this dawn bath of refreshment and renewal.

Now there is a whispering of waters far away. It



"... the calm surface of the sea is broken into splinters of light . . ."

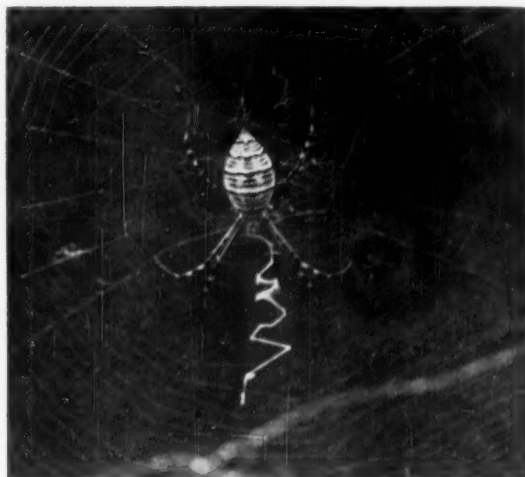
comes closer and closer while the calm surface of the sea is broken into splinters of light on crinkled blue. Soon the water everywhere is stirring and murmuring. Waves swish along Shark Spit as the gulls compete raucously for breakfast. The golden light of sunrise has sunk deep into the sands as they lie quiet under rose-edged clouds. A Diesel engine vibrates in the distance and around the corner of Flag Point voices are thrown towards me. The staccato of a speed boat accompanies them, but it is several moments before either sound is embodied. Then boat and occupants are racing towards the light in a flash of sound and foam.

I look out from a point of rocks beyond the woods to see the mountains bright with day and the last sunrise tinge fading from the clouds. Crows punctuate the lovely tale of light with dark exclamations. ☼ ☼ ☼

Silken Sentences of Argiope

By RALPH J. DONAHUE

Photographs by the Author



A close-up photograph of a banded garden spider, showing the characteristic paired-leg pose. Her "work-done" sign is but poorly written.



A female orange garden spider stands guard over her egg-sac, hung between a wild aster plant and the convenient stalk of a dead weed stem.

"YOU ARE right," my wife said to me, as she came in from the garden. "Minerva cannot spell—cannot spell even the name of her home town! Imagine spelling Merriam as Mirrium!"

This was all in fun, of course. My wife was thus commenting on my report that an orange garden spider, which we had named Minerva, had fashioned, on its web, a design that contained a remote resemblance to the written name of our local post office. Nevertheless, there are people who profess, in all seriousness, to be able to read the signs contained in spider spin-work. They believe they thus can foretell the course of coming events; and such beliefs seem to die hard. In this connection, some of the readers of *Nature Magazine* may recall that shortly after the outbreak of World War I, there appeared in a Kansas City newspaper an illustration, purporting to be a photograph of a garden

spider, on the web of which was clearly outlined the word "war." The caption indicated that certain residents, in the area where the spider "hung out," fully believed that the creature thus was warning this nation against getting into the conflict. Knowing that garden spiders, especially *Argiope aurantia*, often so decorate their snares, I was not inclined to question the accident of the spinner forming the short word "war," even though it was done in Spencerian script. That is, until I noticed that the spider, as illustrated, had only six evenly spaced legs!

Why these gayly marked spiders go in for this "signing off" sentence, since it is made only after the web is fully formed, I have not learned. Even arachnologists, who term it a "stabilimentum," are not in general agreement as to the reason for it. But, whatever its explanation for being, its presence adds interest and sometimes additional beauty to an



This sequence shows how a well-fed female *Argiope* increased her girth during a fifteen-day period.



The banded garden spider makes its "silken sentences" short, and sometimes omits them altogether. Above, a female banded garden spider has written the word "Mrs." in her web, while the much smaller male watches from a nearby post. Below, the struggle between an adult female orange garden spider and a grasshopper has wrecked the web, but has furnished an author-spider with a meal.



already beautiful web-work. Although we can only wonder about the why of these silken sentences, we can, by close observation, learn the manner and means by which they are written. This I was able to do.

At sunup, one dewy morning in August, I came upon Minerva as she was making the final three turns of her net-spiral. At their completion, as I watched, she shut off her liquid-silk spigots and, without so much as a glance at blue-prints, proceeded to a point directly below the web's center. There she turned about, and began a climb upward, dabbing with her spinnerets in slow rhythm, to the right and left, as she ascended.

With the start of these dabbing movements, the silk began to flow again. It formed a zigzag band between two of the web's support lines, thus being reduced in pattern as the space between the lines narrowed. As the web-hub was reached, the silk again was shut off, although the right-and-left rhythm was not. The spider continued her shuttle-like movements up and across her web, to a point about as far from its center as she previously had gone below it.

Again the spider turned about, this time moving downward. Immediately the writing silk was in evidence, and so continued until the central area was gained, where it faded away once more. Whereupon Minerva, apparently having decided that her work was done, settled herself in a head-downward position while she awaited the arrival of refreshments.

Although both sexes of the orange garden spider adorn their webs with these "sentences," those made by the pigmy males, of course, are less conspicuous. Nevertheless, in both of them, one may, if the imagination is lively enough, find such words as "Missouri," "Minnesota," "William,"

"million," and so on. In the case of the banded garden spider, *A. trifasciata*, the writing is much reduced, sometimes being omitted altogether. One hefty female that I photographed had written "Mrs." below her waiting floor. I did not know, of course, whether she was thus telling a tiny male, on a nearby web, that she was already a bride, or wished to be one.

The orange garden spider, and its banded cousin, along with a third species, the silver argiope, *A. argentata*, are widely distributed in both American continents. The last named, however, is seldom found north of the southern tier of States in this country. According to Dr. Willis J. Gertsch, of the American Museum of Natu-



A penultimate male orange garden spider, with an attractive "signing-off" pattern, awaits business among the stems of a rough plant.

ral History, in his book *American Spiders*, the silver spider goes its other relatives one better. It adorns its web with a two-banded stabilimentum that forms a white cross. All three spiders are believed to have originated in the Oriental and Australian regions.

Late in August, the garden spider egg-packets are fashioned, usually well off the web areas, often in the shelter of surrounding foliage. The packet of the orange species, about the size of a wild plum, has been reported to contain an average of a thousand eggs! That of the banded spider, which is more or less cup-shaped (flattened on top) contains only a few less spiders to be.

Wrapped about by vari-colored silk blankets, the *Argiope* eggs pass the winter, hatching into spiderlets at the approach of warm weather. When the time and temperature are right, they emerge into a strange world, Nature having previously endowed them with all that they require to thrive, and to continue the unbroken chain of their being.

While you are in the out-of-doors, this summer, you might like to try your skill at deciphering the "messages" written across the webs of garden spiders. I have found it interesting, as well as rather baffling, to try to read the silken sentences of *Argiope*. ☞ ☞ ☞

Ceylon's Foxtail Orchid

By

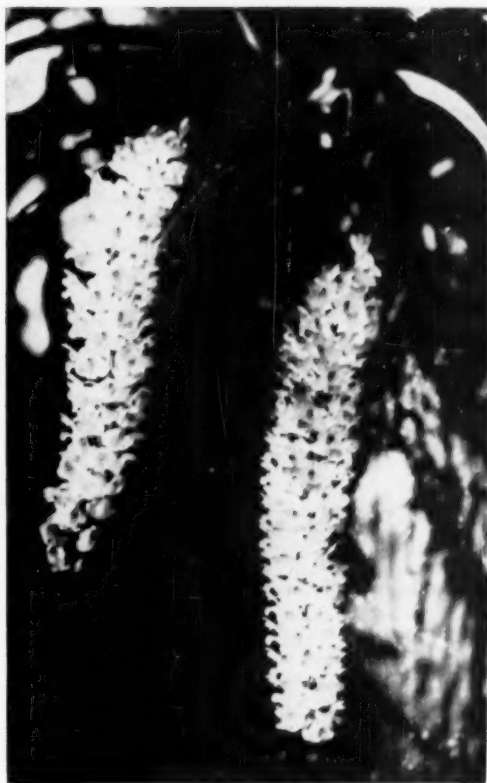
S. V. O. SOMANADER

*Photograph by the
Author*

A MOST BEAUTIFUL orchid, adorning the dry-zone jungles of East Ceylon, and found growing in the upper branches of tall forest trees standing alongside streams, is *Rhycostylis retusa*, the popular foxtail orchid.

A clump of this orchid, with several lovely spikes in bloom drooping down the tree-stem or branch that it clasps for support, is one of the most enchanting sights of the Ceylon wilderness, and is worth going far to see. The flowers are in evidence especially during the early or latter part of the year, but the plant, which can survive prolonged periods of drought, may contain spikes of flowers at other times, as well.

The flower-spikes issue from the main stem, hanging down in a graceful manner, and vary in length from ten to eighteen inches, or even longer. Each spike is set with pretty little white flowers, waxy in character, spotted with amethyst-violet, giving one the impression of a beautiful, tapering cylinder. And it is not unlike in shape to the tail of the fox; hence the name "foxtail!" Although the flowers are only faintly



Blossom spikes of the beautiful foxtail orchid of Ceylon droop from the branches of stream-side forest trees.

scented, they are long-lasting.

It is a pity, however, that not a few vandals of recent times have discovered this precious orchid's various habitats, with the result that it is getting quite scarce in the jungles off the beaten track, even in those areas inhabited by Veddahs, or primitive forest tribes. So, like a few other orchids that are fast becoming rare because of gross vandalism, the wild foxtail has now been listed as a "protected" plant under the Ceylon Fauna and Flora Ordinance.

While the foxtail sheds its allure in the peaceful remoteness of the jungles, it is also a great favorite with those who wish to cultivate orchids in parks and gardens. It enjoys

a high degree of popularity, not only because it is indigenous to Ceylon and exquisitely ornamental, but because it may be grown without much difficulty on cultivated trees, like the mango, in the compound.

Orchids like the foxtail also have a considerable monetary value, especially if they happen to be rare or uncommon kinds. A white variety—a rare albino—of the foxtail orchid was so highly prized, at a sale in London some eighty years ago, that the plant fetched 150 guineas, or almost \$750 in American money, as it was reckoned then. A princely sum for one orchid!

Flowers in Stone

By RICHARD L. THREET

Photograph by the Author

ZOOLOGISTS SEEM to be contradictory when they speak of corals and sea anemones as anthozoans—"flower animals." While the anthozoans are classified properly in the animal kingdom, the casual observer must surely get a first impression of floral affinities, when he sees veritable gardens of corals with delicate tentacles nodding in the currents of shallow ocean waters. Internally, coral individuals develop a strong pattern of radial partitions of tissue, which may be strengthened and supported by secretion of limy panels, and the radial symmetry enhances further the resemblance to flowers.

Corals and their relatives show a great diversity of form and habit throughout the oceans of today, but abundant fossils in rock strata of marine origin, in all parts of the world, show that modern corals represent merely the current stage in a complex evolution that has been going on for about half a billion years. The stony skeletons secreted by corals are especially favorable for preservation as fossils, and in some of the oldest known fossil-bearing strata, the distinctive radial pattern of coral structure provides a clue to the ancestry of modern anthozoans. In the distant past, as at the present time, corals have helped other lime-secreting plants and animals of the ocean to build huge reefs, and many fossil reefs buried under layers of rock have become sites of origin and entrapment of valuable pools of oil and gas.

Some of the most interesting and widely available collector's items for the naturalist are beautifully preserved fossil corals. There is scarcely a region in this country where specimens of coral fossils are not close at hand. For example, the author's geology students find pockets full of horn-shaped coral fossils in rock outcrops along creek banks near Lincoln, Nebraska. At the neighboring University of Kansas, fossil corals can be dug from rock ledges literally a stone's throw from the geology classrooms. In New York State, the great belt of limestone bedrock that runs through the

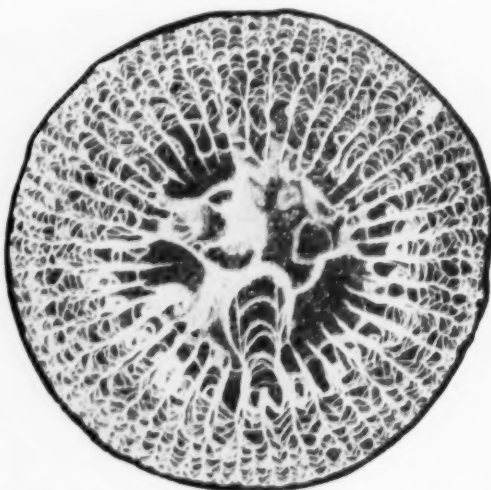
Finger Lake district and on westward to Lake Erie, has long been known to geologists for its wide variety of fossil corals. Before man tampered with the flow of the Ohio River, the rocky ledges of limestone at the Falls of the Ohio at Louisville, Kentucky, were virtually a pavement of fossil corals—a paleontologist's paradise.

A little reading on local geology, or a visit to a nearby museum of natural history, will reveal the whereabouts of your own locality for fossil coral collecting.

While the thrill of finding exquisite specimens of coral fossils is sufficient reward for the time spent in searching, the inherent beauty of the coralline structure can be brought out and appreciated more fully by simple preparation and mounting of the fossil specimens. Especially in cut and polished cross-sections of fossil corals, the flower-like patterns become true works of art, and many are sufficiently unique to be prized by "rockhounds." If thin slices of the stony fossil structures are cemented to glass plates, and ground to paper-thinness, the resulting transparent or translucent "thin sections" become appropriate subjects for photograms, or even unusual slides that can be projected and viewed like photographic

transparencies. They may be cut easily to the thickness of a sheet of cardboard with a lapidary's diamond saw, or even a good hacksaw, for fossils preserved in soft minerals.

The thin chip of rock is then ground smooth on one side, on an abrasive lap or by hand-grinding on a glass plate coated with valve-grinding compound, and the smoothed face cemented to a lantern slide cover glass with Canada balsam. When the cement has set, the chip can be held firmly by the cover glass and ground to the desired degree of transparency on the lap or plate. There remains plenty of opportunity for creativity and sharing of the enjoyment of these flowers in stone.



This photogram was prepared by placing a thin section of actual fossil coral into the film carrier of a photographic enlarger, and recording the projected image on sensitized paper. The tones are necessarily reversed from those of the original, but the pattern is recorded faithfully. The actual specimen was approximately one inch in diameter. The lighter areas represent the original stony skeleton secreted by the coral individual, and the darker areas are crystalline mineral matter (calcite) that was deposited in pore spaces remaining after the original fleshy parts rotted away.

Rock-Cornish Game Hen

By E. JOHN LONG

THE NAME "Rock-Cornish game hen" is so familiar to our housewives and gourmets today, that they might be surprised to learn it was not listed in reference books on wild or domestic fowl, published before 1950. The reason for the omission is a simple one; the Rock-Cornish game hen did not exist before that year, although near relatives of the plump little white bird were imported into America from England as early as 1887.

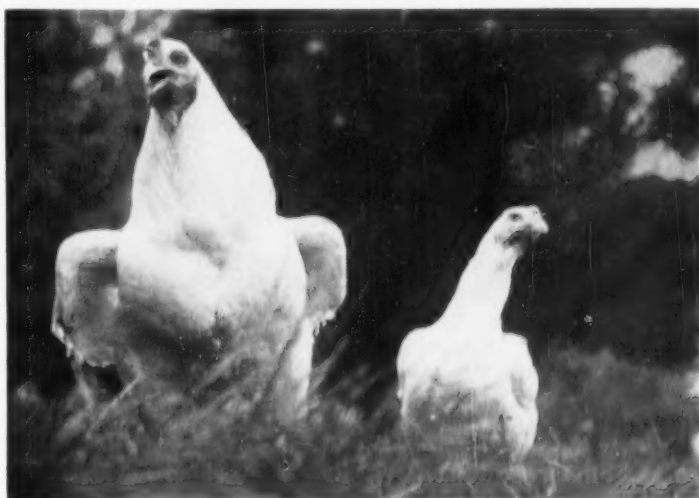
One of the ancestors of this handsome bird was a Malayan fighting cock, a gorgeously trim creature, decked with lustrous greenish-black and burnished red feathers, that arrived in Britain before the Romans. It had undoubtedly been brought overland from the Orient by breeders of fowl used in cock fighting, the most universally popular of early sports.

About the middle of the 19th century, as the result of extensive cross-breeding between the original Malayan fighting cock strain and British fowl, there developed in England the Cornish game cock or chicken, which gained acclaim as much for its excellent fleshing properties as its battling prowess. When Parliament suppressed cock-fighting, however, the Cornish game cock might have disappeared had not a few poultry fanciers bred it for exhibition purposes. The hen was not a good layer, producing only about fifty eggs a year, and mortality among young chicks was high. Thus the Cornish game cock and hen could not compete with harder and more prolific fowl.

The birthplace of the first Rock-Cornish game hen is a farm in hilly northeastern Connecticut, near the village of Pomfret Center. Here a farmer, Jacques Makowsky, and his wife had for a number of years been experimenting with white African guinea hens. Then one cold, windy night in October, 1949, a fire swept through their chicken house, destroying their entire flock.

Instead of trying to replace the guineas immediately, Mrs. Makowsky decided to pore through some of the books on poultry they had collected in their farmhouse. Her eye chanced upon the little-known Cornish game cock and hen. It was about the size of the average American chicken, but it had short legs and a nice round, plump breast. Perhaps it could be cross-bred with American strains to make it harder and a better layer. Husband and wife concluded that it was worth a try.

The Makowskys made a diligent search for healthy birds of the original English strain. (No one knows how "Cornish" got into the name; it was no more plentiful in Cornwall than elsewhere in England). Then began a long series of cross-breeding experiments with several varieties of American fowl. Finally, white Plymouth Rocks proved most satisfactory, producing in 1953 a small, plump hen that, to the gourmet's delight and the hostess's relief, proved almost all tender white meat.



This is the original pair of birds—a Cornish game cock and hen—that was the parent stock of the strain that is continued for crossing and producing the Rock-Cornish game hen, a cross that is not self-perpetuating. In the ancestral line of these game hens is a Malayan fighting cock brought to Britain before the arrival of the Romans.

The Makowskys will not say exactly which type of Cornish game chicken was bought, except that it had white plumage, or just where it was secured—such details being considered trade secrets. They admit, however, that the cross is not self-perpetuating, because a second generation produced by the crossed birds themselves invariably loses the fine attributes of the true cross.

Therefore, it is still necessary to maintain lines of pure Cornish game cocks and hens for production of renewal stock, and of white Plymouth Rock cocks and hens for the parallel purpose of renewing the female half of the Rock-Cornish game combination.

Scientifically, man again has demonstrated his ability to transform, through genetics and patient experimentation, a wiry game bird into a domestic fowl of many desirable characteristics.





Tree-Growing Mushrooms

The oyster mushroom, *Pleurotus ostreatus*, is commonly found growing on deciduous trees, like the elm, oak, maple or beech, in clusters that sometimes attain a weight of twenty pounds.

IN LATE summer and autumn, the wild mushroom season is at its best. Most species prefer the country, but there are five common, edible kinds that may be found without difficulty in the city or suburb, as I found them close to my Cambridge, Massachusetts, home.

These are large, handsome funguses, growing on living trees, usually from wounds or dead places, and often in shelving or frilly formations. They are easy to recognize, impossible to confuse with any of the poisonous varieties, and can be harvested literally by the pound. Their presence always shows that the host tree, if not doomed, at least needs immediate help; but it is only natural that mycophagists, or eaters of mushrooms, should welcome them.

Pleurotus ostreatus, popularly named the oyster mushroom because of its flavor, grows on many deciduous trees, like elm, oak, maple, beech, and birch. Its cap is a grayish or tan color, and its flesh is white. On the underside of the cap, which may be six inches broad, are gills—fine plates, radiating from the stem. The stems are only an inch or so long, and often several grow from a single base. Because the oyster mushroom is large and generally grows in clusters and groups, fifteen or twenty pounds at one time on a single tree is not an unusual occurrence.

Pleurotus ulmarinus, the elm mushroom, also found at times on maples and other deciduous trees, is a close relative of the oyster mushroom. Its cap is whitish, up to five inches broad, and its stem is from two to four inches long. Finding them is a matter of looking up, as well as down, and because many grow fifteen or twenty feet above the ground, enthusiastic mycophagists often collect them with special, home-made poles.

Large, tree-growing mushrooms toughen with age, so that only tender young specimens are really worth cooking. Oyster and elm mushrooms are good when sliced and either fried or stewed in milk, and even better

when cut into bite-sized pieces, dipped in crumbs and egg, and fried in deep fat. While the flavor does not equal that of the cultivated mushroom, it is pleasant and different.

Polyporus sulphureus is commonly called the "chicken of the woods" because of its unmistakable yellow, orange, or salmon color. A true bracket or shelf mushroom, it carries on the lower surface of its cap little pores, or tubes, instead of gills. The caps are thick and up to six inches broad, often fan-shaped, and attached



The "hen of the woods," supposed to resemble a gray hen ruffling her feathers on the nest, is ordinarily found growing on oak trees, close to the ground.

to the host at one edge. This fungus is a parasite; a particular enemy of oaks, it also attacks maples, beeches, and other deciduous trees. Broiling is the recommended way of cooking tender specimens, but the older, tougher ones can be stewed in stock or milk until tender, put through a blender, and used to flavor soups and gravies.

The "hen of the woods," *Polyporus frondosus*, supposed-

By BARBARA B. PAINE

Photographs by the Author

A beech tree, weakened by age, storm, or lack of nourishment, displays a sign of its impending doom in the growth of a *Polyporus sulphureus*.



ly looks like a smoky-gray or tan hen ruffling her feathers on the nest. It grows in crowded frills from short, complicated, interwoven stems that branch from a common base. It is found most often on oaks, fairly near the ground. When fried it has a nutty flavor and texture; mushroom gourmets consider it a great prize.

Hydnum erinaceus, the hedgehog mushroom, is rather less common than the others. Instead of either pores or gills, it has close-set, pendent teeth sometimes an inch long. From a few feet away the head looks like, and is about the size of, a large, irregular cauliflower. It should be eaten only when freshly picked because it easily turns sour. Only the teeth and the more tender parts of this mushroom should be eaten. Like the "hen of the woods," it is excellent fried.

From spore to visible mushroom is a slow process that may take years. All mushrooms, of course, are propagated by spores instead of seeds, and when spores enter a congenial environment, they produce myceliums which are the fungus equivalent of roots. A mycelium grows in the dark, and as it feeds, it hurries up the decomposition of its host. It usually looks like a mesh of fine threads, and can be found under the bark of many fragments of dead wood lying about the woods.

In time, in order to propagate itself, the mycelium produces its fruiting body, which is the mushroom. When a fruiting body appears, at last, the host already may be riddled from top to bottom

with myceliums. And cutting off the mushroom has no more effect on the fungus growth than picking an apple has on the apple tree.

For the mushroom-eater this is all to the good; a tree that once produces a fine edible mushroom may be expected to repeat. In fact, people with access to such trees often water the important surfaces during dry spells, in order to be sure of their crop. But the trees, naturally, suffer as a result.

Plant pathologists and landscape gardeners agree that healthy trees are rarely infected by mushrooms. But when a tree is weakened because of age, carpenter ants, storms, or lack of nourishment, it becomes vulnerable. Treatment depends on the condition and value of the particular tree. Cleaning out a mycelium is so expensive and so difficult that except for historic, or otherwise valuable trees, it is not advisable. When the mycelium has not been at work for long, sometimes minor tree surgery, and heavy feeding of roots and foliage, will prolong the life of the tree. Fungicides are helpful. A fine oak that had produced at least five pounds of *Polyporus frondosus* each October, for three or four years, produced nothing the year following such a program.

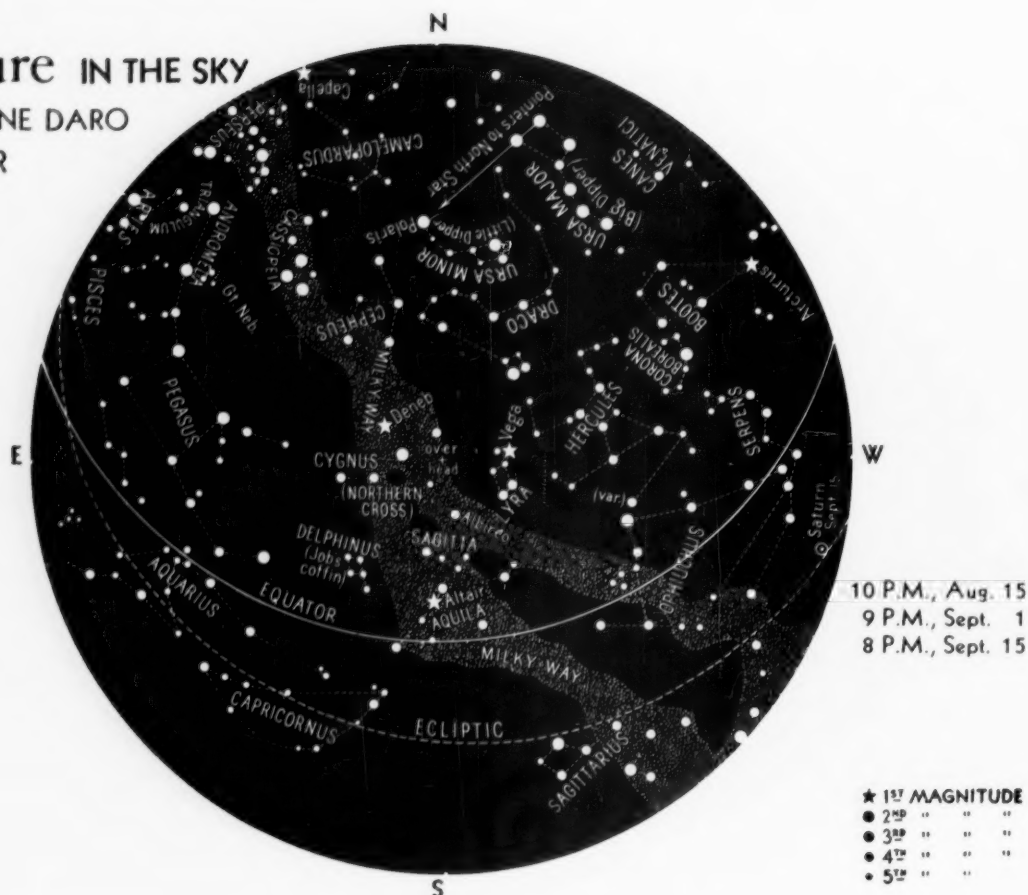
The species of the infesting mushroom is also important. *P. frondosus*, for example, is a parasite, but relatively harmless. *Pleurotus ostreatus* causes sap-rot and *P. ulmarius* wood-rot, but the trees they attack (continued on page 387)



Instead of having pores or gills, the hedgehog mushroom, *Hydnum erinaceus*, has close-set, pendent teeth that are sometimes an inch long.

Nature IN THE SKY

By SIMONE DARO
GOSSNER



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the

map, which is the point overhead, will be seen the constellations visible in that part of the heavens. Times given are for Local Standard Time.

Build a Simple Telescope (II)

IN THE June-July, issue of *Nature Magazine*, I reviewed the basic principles of a simple lens telescope. Two of my colleagues, F. P. Scott and R. F. Haupt, have had occasion to design a small-scale instrument based on those principles, with the additional requirement that it be very inexpensive and easily constructed. This project, which started for the entertainment of their own teenage boys, was eventually taken up by some fifty Cub Scouts in the District of Columbia (under Mr. Haupt's guidance), not to mention most of Mr. Scott's own neighbors in nearby Virginia. They have kindly allowed me to reproduce here a step by step description of the construction of the telescope in its two versions, terrestrial (Galilean) and astronomical (inverting).

The dimensions of small lenses are usually given in millimeters, and I shall abide by this custom because that is the way in which they are listed in optical cata-

logs. If you wish to convert these dimensions into inches, it will be sufficiently accurate to count 25mm. to the inch. The dimensions listed below need not be followed to the letter. They are given only as a guide. I have selected these particular lenses because they are all available from the Edmund Scientific Co., Barrington, N. J., and thus you can find details about ordering by requesting from them their catalog #AL.

For the objective of either telescope, use a plano-convex lens of 38mm. diameter and 279mm. focal length. For the eyepiece of the astronomical telescope, use a double-convex lens of 23 mm. diameter and 27mm. focal length. For the eyepiece of the terrestrial telescope, use a double-concave lens of 25mm. diameter and -48mm. focal length. Do not forget the minus sign in specifying the focal length of this last lens.

Cardboard tubing one and three-quarter inches or less

in diameter is used for the mounting. Mailing tubes are adequate provided they are reasonably rigid. They are on sale at most stationery stores. Cut the tubes carefully with a sharp pen-knife or a jig-saw blade.

The first step is to mount the lenses. The procedure is identical for the objective and the eyepiece.

For each lens cut two rings of tubing about a quarter of an inch wide and with at least the same diameter as that of the lens. If you are lucky, the diameter of the tube will be exactly that of the lens. I proceed on the assumption that you were not that fortunate. Cut the rings open and trim off the excess so that they can be shaped into a smaller ring of the same size as the lens.

Use a piece of masking tape to close the rings. Place one ring on either side of the lens and tape together to handle as a unit. The edge of the lens should be flush with the edges of the two rings, so that the lens is held by the rings without being able to pass through them. Lay aside and mount the second lens in the same way.

In handling the lenses, try not to scratch their surfaces. It may help to hold them with a piece of lens tissue (Kleenex will do). You are now ready to prepare the telescope tubes.

You will need two pieces of tubing that can slide inside each other. The outer one must have a diameter at least large enough for the mounted objective lens to fit inside. Similarly, the inner one must be large enough for the mounted eyepiece to fit inside. If the inner tube does not fit snugly inside the other, slit other tubes lengthwise and wrap them around the inner one, pasting them with rubber cement (found at stationery counters) until the desired thickness is attained. If the inner tube is too thick, it will tend to reduce the field of view of the telescope. Try to avoid this.

The length of both tubes is determined by the focal length of the lenses that have been selected. For the lenses listed above, the outer tube should be eight inches long for the astronomical telescope and twelve inches long for the terrestrial one. The inner tube is cut about one-half-inch shorter than the outer one. See below if you use other lenses.

Handling the mounted objective carefully, see how it fits inside the larger tube. Wrap a few layers of cardboard around the edge of the objective until a tight fit is obtained. Cement it inside one end of the tube. In doing so, have the convex side of the lens facing outward. This lens is very thin, and you may disregard this last instruction if you are unable to determine which is the

convex side. Now you are ready for the final operation.

Mount the eyepiece inside the smaller tube in the same fashion. Because the eyepiece has a much smaller diameter than the objective, it will be necessary to paste several layers of cardboard around its edge before it can be fitted inside the tube.

Slide the tubes inside each other, keeping the lenses at the outer ends. The telescope is now finished. It is focused by sliding out the inner tube until a sharp image is obtained. A thin coat of shellac on all sides of the tubes will prevent lint from depositing on the lenses, and will give a neat appearance to the instrument. However, this is not absolutely necessary. While using

the shellac, be sure to protect the lenses from possible spatter.

The lenses described above will yield a 10-power astronomical telescope, and a nearly 6-power terrestrial instrument. The power is given by the ratio of the focal length of the objective to that of the eyepiece. If you select other lenses, choose a combination that does not exceed the power given here. It is almost impossible to use a more powerful instrument without a tripod to support it. The length of the objective tube should be about three-quarters of an inch to an inch shorter than the numerical difference of the two focal lengths in the case of the astronomical telescope, or the numerical sum of these focal lengths for the terrestrial one.

The ratio of the diameter of the objective to its focal length

should not be less than 7. Any smaller ratio would result in severe image distortion.

If some of the lenses you have ordered turn out to have a bluish cast, do not complain to the company. This tint is due to a special coating that minimizes reflections and makes a better lens.

The moon will be full on August 10 and September 9, and the New Moon will occur on August 25 and September 23.

Fall will begin on September 23 at 2:27 A.M., Eastern Standard Time.

Mercury will be placed most favorably for observation on August 13 and September 25. On August 13, it will be an evening star setting about an hour after sunset. On September 25, it will be seen as a morning star, rising about an hour and one-half before the sun. It will appear grazing the moon on August 26.

Venus will be an evening star throughout August and September. It will be found low (*continued on page 385*)



Young astronomers inspect their simple but effective homemade telescopes.

Nature IN THE SCHOOL

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University,
and Director of Nature Education, The American Nature Association

Snakes in Captivity

WHETHER MANY ADULTS like it or not, many youngsters like snakes so well that they persist in wanting to keep them in captivity. If the snakes are harmless, it should be a good thing to encourage this interest, not only for the good of the snakes and the youngsters, but possibly to educate the adult skeptic.

Possibly the best four references on the care of snakes by amateurs are the following:

Hillcourt, William, *Fieldbook of Nature Activities*. Chapter 5. G. P. Putnam's Sons, New York. 320 pages. 1950.

Moore, Clifford B., *The Book of Wild Pets*. Charles T. Branford Company, Boston. 553 pages. 1954.

Brown, Vinson, *The Amateur Naturalist's Handbook*. Little, Brown and Company, Boston. 475 pages. 1948.

Snedigar, Robert, *Our Small Native Animals: Their Habits and Care*. Random House. New York. 308 pages. 1939.

Harmless snakes first

I cannot assume the responsibility of suggesting that beginners have anything to do with keeping poisonous snakes in captivity, other than to suggest that a beginning be made with harmless snakes. If the beginning is with gentle, harmless snakes, then proceeds to aggressive, larger snakes that are also harmless, it is possible that a proper respect for snakes may develop. Then a beginning may be made, under expert advice, as to what to do with poisonous snakes in captivity. About the only excuse for an amateur to wish to capture a poisonous snake alive is where such animals have a commercial value to zoos, professional collectors, or to supply poison to venom laboratories. In general, let us start by leaving poisonous snakes alone.

This should not be taken to mean that anyone should be discouraged

about getting acquainted with living snakes. On the contrary, they usually need encouragement, and such encouragement should pay off in a more rational understanding of the usefulness of some snakes, and a general increase in the appreciation of the niceties of balances in Nature.

Three steps in dealing with captive snakes might be considered—the preparation for their reception, the capture of the snakes, and their care in captivity.

Since snakes live in varied habitats it is important to know the ecological needs of the snakes to be used. Water snakes, milk snakes and rubber boas cannot be too happy in the same type of confinement. The water snake must have water. The milk snake can do well on a firm base with access to water and to dry areas. The boa must have the opportunity of burrowing in loose material.

Home for snake

As a starter, let us suggest that we begin with a good-sized cardboard carton that is at least as long as the snake you plan to keep, that is at least half as high as the snake is long, and at least half as wide as the snake is long. Then let us close the top, gluing or stapling the cover in place. Now, with a strong, sharp knife, let us cut an opening in the center of the top so that there is a considerable horizontal overhang that your snake presumably cannot overcome. You now have the basic cage. You can look down into it, can reach in and care for the captives, and can clean it if necessary. In such a box you may set a coffee can of water and surround this with earth or sand, and some loose trash in which concealment is possible. If the box is so set outdoors that the sun can shine into it and yet the rain be kept off it, it may be ready for occupancy.

More elaborate and permanent cages may be made, but the essentials have been covered. Your box may be made of wood, metal, glass or

concrete, but it will be basically as suggested. Usually the cage should be large enough to permit direct sunlight to reach some sort of mound within the cage. This mound may be merely a good-sized stone, but it gives the snake the opportunity to sun itself if it wishes. Proverbs XXX, 19 tells us that a "serpent on a rock" is one of four wonders of Nature to observe. Remember snakes must have water to drink. They also must be able to live where it is neither too warm nor too cold. If you would be comfortable at the temperature in your cage the chances are that your snake will be. Of course, in zoos tropical snakes have requirements that need not concern us here.

Capturing snakes

It is often best in capturing snakes to use two hunters. One may uncover the snake or hold its attention, while the other makes the actual capture. Where poisonous snakes are to be found, the capture should be made circumspectly, of course. Usually an aggressive snake may be held down gently but firmly by the foot until it can be grasped just behind the head, lifted and put in the collecting bag.

Many collectors use a snake stick to take their animals in the field. This may be merely a stout stick three or four feet long with a fork at one end, the prongs of which are about two inches long. This fork is put on the snake's neck and the animal is held down in this way until it can be grasped conveniently. Some prefer a noose to the fork. This is commonly made of a good strong fish line. The noose should be tied with a good slip knot, such as a running bowline, and the noose should be about twice as wide as the snake's head.

Many use a snake stick which consists merely of a hook on the end of a pole. The hook is slipped under the middle of the snake and the animal is lifted into the air. Farmers usually use a hoe as a hook to lift peppy snakes.

Care should be taken in selecting the snakes that are put together in a bag. A relatively unimportant snake may well eat the snake you most wish to keep. I once sent by express a collection of local snakes to Dr. Guthrie, who wrote the *Snakes of Iowa*. He freed them temporarily in a cage and stepped into a class. When he came out a milk snake had

eaten two of the snakes he most wanted to keep, and which I had had most difficulty in finding.

Get rid of mites

Wild snakes frequently are parasitized by mites. If the snake is left for a while in lukewarm water the mites may be drowned, or may make their way to the snake's eyes. There they may be destroyed by touching them with olive oil, which prevents them from breathing.

Snakes do not need to be fed frequently. A good meal every week or so may be adequate usually, and some rattlesnakes may thrive with only one meal a year. Our charts suggest the appropriate food for many snakes. Usually snakes seem to prefer to take their food alive, but a hungry snake can be fooled by suspending appropriate food before it on a string and swinging the food before the snake. They may even take small pieces of meat in this way. If the meat is on a thread and can easily be slipped off the thread by the snake your feeding problem may be solved.

I would suggest that instead of letting your snakes have their own way all of the time that you control their behavior somewhat. A hungry snake will show you how it eats, while one that has gorged itself when you are not around will be less interesting. Frequently large snakes will capture and promptly eat little snakes when given the opportunity. Once anyone has seen this sort of thing happen he knows that some snakes eat others and may be of value in controlling other snakes. A prejudice may vanish with this experience. In spring, if snakes are kept apart and brought together at will when they can be observed, the courtship story and the mating procedure, if any, may be observed.

I suggest these controlled observations because unless you keep your snakes in captivity to study them you probably should not keep them at all. Certainly if you keep them in captivity you have a moral obligation to keep them comfortable. Learning how to do this may bring you to a better understanding of the role of these most interesting animals. ♀

Paper Use

Statistics compiled by the American Forest Products Industries, of Washington, D.C., show that the yearly per capita consumption of

paper and paperboard in the United States is now 421 pounds, with 804 domestic mills making paper and paperboard, and 330 turning out pulp. Currently employed by these industries are some 1000 technically trained foresters who supervise the growing of timber as a crop on tax-paying lands, and who lend assistance and advice to small woodlot owners in management of farm woodlots.

League Resolutions

During the recent thirty-fifth annual convention of the Izaak Walton League of America, Inc., in Washington, the delegates adopted a resolution deploring the polluted condition of the Potomac River, and determined to hold no more national conventions in Washington until river pollution sources in the District have been dealt with effectively. Other resolutions favored continuation of public law 660, the pollution control law, and measures for prevention of atmospheric pollution, as well as favorable Presidential, Congressional and Executive Department consideration of a national outdoor recreation resources review. The League also went on record as endorsing an immediate study and survey of Admiralty Island, in the Alaskan inland passage, looking to its possible establishment as a national park, and it urged legislation for the perpetuation of remaining wilderness areas in the public domain, as well as requesting Congress to desist from encouraging wetland drainage, with its consequent increase in agricultural acreage.

Forestry Scholarships

On June 24, six recipients of the eighth annual special scholarships awarded by the National Lumber Manufacturers Association began ten weeks' on-the-job training in wood products research at the laboratory of the Timber Engineering Company in Washington, D.C. The six students, nominated by 13 of the nation's leading forestry schools, are William H. Hunt of Colorado A&M College; Roger F. Sutton of Yale University; John S. Fujii, of the University of Washington; Marvin F. Bengelsdorf of the University of Michigan; Charles G. DeRidder of Michigan State University, and David A. Strause of Oregon State College. In addition to the training period, each receives a cash award of \$500, and travel expenses.

Lion and Lamb

The June bulletin of the Arizona Humane Society of Phoenix, "Kindness in Action," tells a heart-warming little story of one of the incidents of the Society's daily work. The story concerns a fledgling sparrow that was brought to the Society's shelter in Phoenix. "Barrett Long, our kennelman, fed the baby bird and put it in a cat-carrying cage," relates the bulletin. "Later, the bird was missing. Barrett started searching, and felt certain that the bird had somehow gotten in a cage with one of our many cats. He was right! The baby bird had gotten out of its makeshift cage and into a cage with a mother cat. When found, the bird was nestling up to the cat, and the cat was as solicitous as she would have been with a baby of her own!"

Autumn Film Strips

The Jam Handy Organization, 2821 E. Grand Boulevard, Detroit 11, Michigan, has prepared for the coming school year a new series of six filmstrips, in full color, entitled "Autumn is Here," which illustrate the changes made by the plant and animal world in preparation for winter. The series is planned for the easy comprehension of primary children, and may be obtained in part or whole directly from the Jam Handy Organization and its authorized dealers.

Inventive Spirit

A Smithsonian Institution mammalogist will make an attempt this season to devise methods of trapping mammals of the "fourth realm of life," the canopy of the tropical rain forest, which extends as a green belt nearly around the world. Dr. Charles O. Handley, Jr., of the staff of the U.S. National Museum in Washington, D.C., will work in cooperation with scientists of the Gorgas Memorial Institute of Tropical and Preventive Medicine in the Republic of Panama, with the hope of tracking down the intermediate host, or hosts, of the highly fatal disease known as sylvan yellow fever, which has moved slowly north from the South American jungle until now it extends at least into Guatemala. Trapping wildlife atop a green shield of rain forest would appear something of a challenge to ingenuity—and Dr. Handley has been delegated to find the ways and means of doing the job.

THE Nature CAMERA

By EDNA HOFFMAN EVANS

Color Is Enthralling

THE MORE COLOR pictures a camera fan takes, the more enthralled he becomes with the possibilities of color photography. But the more slides he accumulates, the more overwhelming become his problems of classification, storage, and slide preservation.

Eventually, the problem of what to do with hundreds of slides, and, more specifically, how to find a single pictorial needle in that photographic haystack, will become almost unsolvable. Having reached that stage myself, and knowing other photographers in the same situation, I am going to devote this section to a discussion of what to do with the slides as they accumulate.

First, there is the problem of classification of slides into some orderly system. Second, there is the problem of how to store the slides between showings in such a manner that the classification can be maintained and any one or more slides can be found readily when they are wanted.

There are, of course, various ways of storing slides between showings. These range from the completely chaotic method of dumping them all into one huge container to the neat device of numbering and cataloging them under a variety of classification systems. The photographer with an orderly mind and a knack for book-keeping is at a definite advantage here.

Containers available

Photography supply companies have developed a variety of storage containers for slides. Highly satisfactory is the suitcase-shaped metal file box that will hold 150 slides, either glass-mounted or in cardboard readymounts. The Eastman Company has several different file boxes—the Kodaslide Ready-file (\$1.95), which holds 200 cardboard slides or 66 glass ones; the Kodaslide Compartment file (\$3.94), with twelve swing-out compartments that hold

240 cardboard or 96 glass slides; the Kodaslide 400 file box (\$5.75), styled like a book and holding 400 cardboard or 176 glass slides, for example. Other manufacturers make such containers, also.

Some projectors have automatic slide-changing devices that also serve the purpose of storage. In some cases special containers are required by certain makes of projectors. However, a majority of them will take the automatic slide-changer made by the Airequist Manufacturing Company, Inc., New Rochelle, N.Y., or by Argus Cameras, Inc., Ann Arbor, Mich. These store 36 2 x 2 slides and



Aids for slide filing. Shown here is the metal box that holds 150 slides, the Kodaslide compartment file, Airequist magazines, and the plastic containers in which slides are usually returned from the processor.

are highly satisfactory for the showing of sequences such as scenes from a summer trip or some other specific series. These magazines, however, take cardboard mounts only; glass mounts do not fit.

Obviously, when one's slide collection begins to number into the hundreds, it gets increasingly hard to find one specific slide without going through the entire accumulation, or at least a time-consuming portion of it. Some sort of a cataloging system must be developed. Happy is the photographer who realizes this before his collection of haphazardly filed slides has grown to astronomical proportions.



To mount a slide or not to mount it? Shown here are some of the materials for doing so. In the picture are metal slide binders, masks, tape, a glass-and-tape mounted slide, pocket knife for extracting slides from readymounts, and a small brush to remove dust particles.

Built-in system

The mechanical slide containers and metal boxes each have a built-in cataloging system whereby the slide can be listed by number and by name, or subject. This is all very well, but it assumes that the slide, once filed, will remain indefinitely desirable, and that it will be returned to that location after each removal for showing.

This sort of catalog system, to my way of thinking, is too rigidly set to be useful. It does not readily permit editing, or substitution of better slides when such are available. It also assumes that new storage boxes will be bought as the collection grows. Carried to extremes, the cameraman will eventually have to pitch a tent in the back yard to live in because his house will be completely filled with slide containers.

The most efficient cataloging system I have observed being used by others (my own is an almost hopeless muddle badly in need of overhauling) is a combination number, notebook, and file card set-up. The people who use it admit that they began it early in the course of their picture-taking careers, and that it has grown with the collection. But they think it works as well with thousands of slides as it did with a few hundred.

The system operates as follows: When the slides are returned from the processor each is projected, given a serial number, and the number is listed in a loose-leaf notebook. Along with the number, in parallel columns, are listed the general subject or specific title, as well as data as to where and when taken, and the like.

Change is possible

If, at a later date, another and better picture of the same scene is taken, the first slide is removed from the collection and the new one put in. A line is drawn through the number of the discarded slide; the new slide gets a new number and cancelled numbers are not re-used. This editing and substituting better pictures for previous ones is something we could all practice. As for the discarded slides, they are always welcomed at veterans' hospitals. The Photographic Society of America has a special project, in cooperation with the Red Cross, to supply more than 150,000 slides of such nature this year.

The card file system comes into use in arranging slides according to subject matter for consecutive showing. Let us say, for example, that our friends want to show a series on Arizona, or Carlsbad, or the Everglades, or Yellowstone. On a 3 x 5 card in the "A" section they will list the numbers of slides on Arizona. Then, by pulling these slides (and they may come from several different storage boxes) the show can easily be put on the road. After showing—and this is vitally important—each slide must be returned to its own place according to number.

The card file also serves to keep track of slides out to salons, and of the rating each entry received from the judges.

To mount slides or not to mount them is another question soon faced by the color slide enthusiast. Mounting slides in glass is a tedious process, and somewhat expensive. For the person who uses his own slides and takes good care of them, it may be an unnecessary process. But for the person who enters his slides in contests, sends them out on circuits, or entrusts them to the tender mercies of others, mounting is a "must" if the slide is long to endure.

Slide binders

There are numerous makers of slide binders and I cannot hope to list them all. In the metal binder class, to name only three, are Brumberger slide binders made by Brumberger Sales Corp., Brooklyn 32, New York; Star D made by the Davidson Manufacturing Co., 2223 E. Ramona Street, West Covina, Calif.; and Esco aluminum-glass magic mounts made by the Erie Scientific Corporation, Buffalo, N.Y. Card-board Ready-Mounts can be obtained from Eastman Kodak, or from Hud-

son Photographic Industries, Inc., Mount Airy Road, Croton-on-Hudson, N.Y. (to name only two).

The metal mounts are easily put together, but they have several drawbacks. First, they are comparatively expensive; second, it is difficult to get labels—the maker's name and address, title, and other data often requested for showing or contest purposes—to stick; third, some of them tend to come apart again as easily as they went together. Because of these, and because it is a less expensive process, some photographers think that 2 x 2-inch glass slides over standard masks, the whole held together by adhesive-type tape, is the best.

It takes patience, time, and a steady hand to get slide and mask, glass and tape all put together properly. Rather complicated holding devices have been developed to help with the job, but simple home-made ones can be devised, also. E. Leitz, Inc., of New York, supplies the cover glasses and special cloth tape. Eastman has a binding tape, too. Another tape, recommended by those who have used it, is known as Scotch Brand Acetate Fiber Tape, No. 750, made by the Minnesota Mining and Manufacturing Co., of St. Paul, Minn.

Regardless of the binder used, the transparency must be removed from the ready mount. The simplest protective device—that of mounting a pair of cover glasses over the cardboard mount—will not suffice. The result is a slide too thick for use in most projectors and such slides are not accepted in many salons or showings.

Protection of glass

Once under glass, the transparency is protected from dust, scratches, fingerprints, and other hazards. There are, however, other difficulties that arise with framed slides. In damp climates, for example, some experts advise against glass-mounted slides; they say it is too easy for moisture to get in and cause the slide to mildew. Besides that, discoloration can result from the drying of this moisture when the slide is exposed to heat too long in a projector. To make a mounting completely moisture-proof, some photographers dip the taped edges into quick-drying lacquer, making an additional step in an already lengthy process.

Besides giving them protection by mounting his slides, the photog-

rapher can also do much to solve problems of cropping or composition. Not all pictures look best in the standard horizontal or vertical "double frame" aperture. Sometimes there is a slight bit of discoloration on one edge of an otherwise excellent picture. This is the result, perhaps, of being the first or last picture on the roll. Sometimes there is some other distracting element; or perhaps better composition results from a cropping job.

GEMounts, 5817 Sheridan Avenue, Detroit 13, Mich., supplies an interesting selection of masks. They range from a long narrow panel just half as wide as it is long, to a square, a triangle, an oval, or a circle. The masks come in gold or silver, and are cut to fit the standard 2 x 2 mount. There are even more exotic shapes to suit special situations—stars, keyholes, oriental domes, shields, octagons, and even double circles. A descriptive catalogue and price list will be sent upon request. GEMounts also supply regular cardboard mounts.

So, as I said in the beginning, there are almost endless—and highly intriguing—possibilities to be discovered by the color photographer as his slides accumulate. ■ ■ ■

Telescope

(Continued from page 381)

on the western horizon and will set approximately one hour and one-half after sunset. On August 22 it will be half of one degree south of Jupiter, and the pair should be very conspicuous in the sky. Venus will be directly south of the moon on September 26.

Mars, in Leo, will be lost in twilight during both months and extremely hard to see.

Jupiter, in Virgo, will be found low on the western horizon at dark. It will set two hours after the sun on August 15. By the middle of September, it will be lost in the evening twilight.

Saturn, in Ophiuchus, will set around midnight on August 15, and at about 10 P.M. on September 15. It will appear to graze the moon on August 4 and September 28. On September 1, an occultation of Saturn by the moon will be visible in most of North America, with the exception of both the Atlantic and Pacific coasts.

The Perseid meteor shower will reach its maximum on August 12, with a maximum zenith rate of 50

per hour. Some meteors belonging to this shower will be seen for about ten days on either side of August 12. Observations will be somewhat hampered by moonlight this year, because the Full Moon will occur on August 10. The meteors should be seen mostly after midnight, in the eastern and northeastern sky. ❖❖❖

Christmas Cards

Peter Scott, noted British artist-conservationist-naturalist, has designed some attractive Christmas cards for the International Union for Conservation. They show five Hawaiian wild geese, or nene, in flight. The cards are four and one-half by five and three-quarters-inch folders of blue paper with matching envelopes, the third page carrying Christmas and New Year greetings and have room for surprinting if the user wishes to have this done locally. Any profits from the sale of the cards go to aid the important conservation work of the Union. A limited number of the cards are available from the Commission on Public Information, I.U.C., 1214 16th Street, N.W., Washington 6, D.C., for eight dollars in lots of fifty. Checks should be made out to the Commission.

Dome Island

The Federated Garden Clubs of New York State, through their president, Mrs. Dunham C. Jones of Brooklyn, have presented Nature Conservancy, of Washington, D.C., with a check for \$1000 toward the Dome Island endowment fund for the maintenance of this Lake George island as an educational, research and recreation preserve. Dome Island was given to the Nature Conservancy by John S. Apperson of Schenectady with the proviso that an endowment fund of \$20,000 be established to ensure the maintenance of the island as a sanctuary.

Model Law Favored

New support for legislation outlawing the shooting of hawks and owls materialized last fall when the National Grange went on record as favoring a model law for the protection of all species of wild birds except the English sparrow, the European starling and the crow. Such a model law was suggested for inclusion in 1957 State legislative programs by the Committee of State Officials on Suggested State Legislation of the Council of State Governments, and would permit shooting of hawks and owls only when found in the act of destroying poultry.

Conservation Fellowships

The National Wildlife Federation has announced that its 1958-59 fellowships, in amounts up to \$1000, will be available to qualified individuals working in the fields of conservation or conservation education. Teacher training, journalism, textbook development, state programs, and conservation workshop techniques are examples of activities that might be considered appropriate to the fellowships, which will be awarded undergraduates, graduates, and special, or non-academic, students. Application blanks and information may be obtained from Ernest Swift, Executive Director, National Wildlife Federation, 232 Carroll Street N.W., Washington, D.C.

Water Resources Council

Progress in public education and the stimulation of industry cooperation to abate pollution was reported at the second meeting of the Water Resources Council, Inc., held in Harrisburg, Pennsylvania, May 10. The American Nature Association, which is one of the cooperating organizations, was represented at the meeting by its president, Richard W. Westwood. The Council will carry on educational work and will make awards to industry for outstanding collaboration in keeping streams clean, or for aid in restoring such streams to conditions of purity. The Council believes that pollution control can be furthered by achieving greater public support for pollution abatement laws now on the statute books.

Long-Lost Cousin

Now and then, some "extinct" creature of fossil antiquity abandons its prison of rock strata and climbs right out into the world of the living. Recently a long-lost relative of the trilobite, that invertebrate citizen of the seas of half a billion years ago, has been dredged up from the black bottom muds of at least three localities—Long Island Sound, Buzzard's Bay in Massachusetts, and San Francisco Bay—and added to the crustacean collection of the Smithsonian Institution in Washington, D.C. Dr. Fenner A. Chace, of the Institution, says that both the trilobite and the new discovery, known as a cephalocaridan, had a common ancestor in vastly remote pre-Cambrian time, but that the trilobite died out, while the newcomer somehow survived.

Bulletins

"Economic Problems of Natural Resource Use," by William H. Stead, outlines America's important remaining natural resources (mostly of a non-renewable nature) and the economic problems that will present themselves, as resources are further depleted by a rapidly expanding population, by wastage in war, and by destructive practice. With a study guide by George L. Ferish, this 64-page book is available from the Joint Council on Economic Education, 2 West 46th Street, New York 36, New York, for \$1.25.

"Fish News for Timber Operators and Fishermen" is Bulletin 4 of the California Department of Fish and Game, and is the story in pictures of lumbering practices in that State that have damaged or destroyed salmon and steelhead trout spawning streams, and in some cases the streambeds themselves. Some of the logging pictures in this excellent publication will make the Nature enthusiast wince. From the California Department of Fish and Game, 722 Capitol Ave., Sacramento, California.

"Ditches, Dust and Ducks" is a reprint, in pamphlet form, of a series of articles by R. G. Lynch, of the *Milwaukee Journal* staff, publicizing the destruction of waterfowl habitat in the northern plains States by subsidized farmland drainage under the farm aid program. It notes the growing movement among conservationists to oppose a practice that withdraws land from cultivation with one hand to abate farm surpluses, and increases surpluses with the other by placing more wetland under cultivation. Obtainable from the National Wildlife Federation, whose address is 232 Carroll Street N.W., Washington 12, D.C.

The Stanford Research Institute "Journal" is a new quarterly publication in modern magazine format "addressed primarily to leaders in business, industry, education and government," in the words of Institute Director E. Finley Carter. It will include articles on chemistry, physics, electronics, biology, economics and other branches of science. The subscription price is \$4.00 per year, or \$1.00 the copy, and inquiries should be addressed to the editor, SRI Journal, Stanford Research Institute, Menlo Park, California.

Casanova

(Continued from page 357)

hungry and tired. Disturbing the birds for the last time, we packed our equipment. The females stood clucking in the distance, and the male became hysterical and fluttered low over our heads emitting short, frog-like clicking noises.

We retraced our steps. A garter snake sped through the grass again. The female red-wings waited impatiently for us to clear the area, and colorful Casanova took his stand on high, ignoring the blazing heat and humid air. He turned in our direction as we departed and called, *O-ka-leeve, o-ka-leeve, o-ka-leeve!* ♀ ♀ ♀

Mushrooms

(Continued from page 379)

are almost always in poor condition, to begin with. *Polyporus sulphureus*, on the other hand, is most destructive, and when its fruiting body appears, it is time to think about replacing the tree. But before you replace it, eat the mushrooms! ♀ ♀ ♀

Swamp

(Continued from page 348)

we can insist that our folk in Congress shall look twice; think, weigh and study damage that may be done to existing values before voting for any water-tinkering program or project. This applies to pothole drainage, sponsored by Agriculture; reclamation projects, whether drainage or irrigation, of Interior; Army Engineer schemes labeled flood control.

Perhaps the most potent action lies in rallying local conservationists to insist that all potential losses be assayed and tabulated whenever a local drainage or impounding scheme is proposed. That most positively can halt many, many big-big drainage schemes before they are more than started. Right at home, this is an area in which you can do real service. ♀ ♀ ♀

Ancient Egg

Do you like your eggs strictly fresh? If so, the egg recently acquired by the American Museum of Natural History in New York would hardly be for you. It was laid perhaps 120 million years ago by the dinosaur *Hypselosaurus priscus*, and, with several other fossil eggs of the same sort, was discovered at Aix, France, in 1869, and recently traded to the

Museum by its owner for the egg of the horned dinosaur *Protocerops*. This rarity is described by curator Dr. Edwin H. Colbert as "about twice the size of an ostrich egg," with perfectly preserved inner parts, and portions of the original shell intact.

New and Useful

The warm days of vacation-time fill the outdoor places with enthusiasts, and fill mosquitoes, black flies, chiggers and assorted other pests with the blood of the enthusiasts. If you feel this is not a fair exchange, the Orchard Paper Company of St. Louis, Mo., has a new product, called "Orcopel," that is said to be effective against the pesty insect hordes, consisting of a chemically treated, lightweight creped tissue for wiping on exposed areas. One application is claimed to be effective 4 hours, and the sheets of repellent paper come in a handy plastic pouch for pocket or purse. Your local drug, grocery, hardware or sporting goods shop will have Orcopel for 25 cents per pouch.

People who must know how fast the wind is blowing—boat-owners, fishermen, or amateur weathermen, for example—can now measure its velocity with practical accuracy at slight cost. A new unit, read like a thermometer, and available either from the Durkee Company, 30 South Street, New York City 4, or from sporting goods and hardware houses, indicates wind velocities up to 60 miles per hour. This hand-held wind-meter is lightweight, attractive, and costs only \$4.95.

A new, waterproof floating flashlight for the fisherman who occasionally drops one overboard has been marketed by Bright Star Industries of Clifton, New Jersey. Of tough gray plastic, Bright Star light #8118 has a white, luminous end cap for easier location; a three position waterproof signal switch, and an emergency red lens ring, among other conveniences. It is \$3.95 at sporting and supply stores, countrywide.

Jack and the Beanstalk, for the younger folks, is a toy that brings Nature into the home for \$1.00. It consists of a 4-inch plastic bowl of plant food that grows "miracle" beans with the simple addition of water, often at the rate of several inches a day. It comes complete with 9 stand-up cutouts, and the text of the famous Jack and the Beanstalk story, from Arkard Service, 5434 N. Glenwood Ave., Chicago 40, Illinois.

Bulletins

"Spiders" is the title of the April, 1957, issue of the *Kansas School Naturalist*, published by the Kansas State Teachers College, of Emporia. This issue, highly readable, presents the facts of spider-life. It is available free on request to citizens of the Sunflower State, and for others, a subscription rate, based on cost of publication, is being arranged. Inquiries should be made to the Kansas State Teachers College, Emporia, Kansas.

"The National Park Story in Pictures," and "Areas Administered by the National Park Service," are two recent publications available from the Superintendent of Documents, Washington 25, D.C., for 65 and 20 cents, respectively. The first, by Isabelle F. Story, sketches briefly in text and illustration the story of our National Parks, while the second is the latest directory for all areas administered by the Service, with 50 pages of facts and figures.

"Report on an Ecological Survey of the Serengeti National Park, Tanganyika" is the fruit of an ecological survey carried out by W. H. Pearsall, Quain Professor of Botany at the University of London, for the Fauna Preservation Society of that city. The underlying motive for this work was the threatened partition of the Serengeti National Park in Tanganyika, East Africa, with its abundance of representative fauna—a move that aroused not only African wildlife societies, but also caused grave concern in conservation organizations internationally. Professor Pearsall's careful report, and its included recommendations, have been submitted for consideration of the Tanganyika government's Serengeti Committee. Sixty-four pages, maps and tables, 5 shillings (70 cents), from the Fauna Preservation Society, c/o the Zoological Society of London, Regent's Park, London N.W. 1, England.

"Touring with Towser" is, as the title suggests, a booklet for the family that must include in its travel plans nightly lodging for the family dog. The latest edition of "Touring with Towser" lists some 4750 establishments in this country, by States, that will shelter both human and canine, with helpful information and travel suggestions for Towser. It may be obtained for 25c from the Gaines Dog Research Center, 250 Park Ave., New York 17, N.Y.

THE Nature MARKET

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TALES BY AUNT BESS. Regarding Sea-fairies, which, through mysterious underground rivers, reach "Fountain of Youth Cavern" beneath Florida Everglades, and, instantly rejuvenated, avoid becoming Aquafish. Finally, they entertain excited juveniles with astounding stories about wildlife everywhere. \$2.45. **FREE CIRCULARS.** (Sequel during 1957) Also **CANADIAN MEMORIES \$3.25.** BRUGA-DOON PUBLISHER, 1547 N. West Central, Orlando, Florida. (Public Libraries).

BUSINESS OPPORTUNITIES

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Age of Brawn

Every year, thousands of visitors to the United States National Museum in Washington, D.C. wander among the king-sized skeletons of the Smithsonian Institution's dinosaur collection. Whatever personal reaction to this remarkable, if rather somber, collection may be, there are many individuals who, after viewing, would like more information about the reptilian family tree that bore such grotesque fruit during the "middle ages" of life on our planet. Stripped, for the most part, of technical verbiage, the Institution's handsome booklet entitled "The World of the Dinosaurs" gives this information in 22 readable and illustrated pages. It is written by David H. Dunkle, Associate Curator of the Division of Vertebrate Paleontology of our National Museum, and is fifty cents, from the Publications Distribution Section of the Smithsonian Institution, Washington 25, D.C.

Annual Meeting

Wood utilization, from stump to finished product, will be the subject of The American Forestry Association's eighty-second annual meeting in Madison, Wisconsin, September 30 to October 2. National authorities will discuss the key aspects of woodland management to secure maximum yields of wood and fiber, the integration of primary manufacturing plants to eliminate waste in sawdust and bark, new techniques in processing finished wood, paper and chemical by-products, and the future of wood fiber in the world of tomorrow.

Center Dedicated

A new visitor center and museum has recently been opened on the south rim of the Grand Canyon National Park. The center, of stone and stucco-finished concrete block construction, will provide an orientation point for visitors to the south rim, with maps, photographs, and paintings (including two dioramas), and will also provide fire-safety for the large collections of exhibits and study materials that have been accumulated at Grand Canyon. A small auditorium to seat 108 persons has been provided, as well as a naturalist workshop and a library.

Musk Turtle

The musk turtle of the East, in common with other turtles, should be encouraged in our waters rather

than destroyed. "The musk turtle does a great job as a scavenger," says Professor Norman E. Hartweg, curator of reptiles and amphibians at the University of Michigan Museums. "By eating dead animals that sink to the bottom, he undoubtedly removes many diseased ones, and so protects the population from contamination by polluted water."

Muir Memorial

On May 5, forty acres of land on the shore of Fountain Lake, near Montello, Wisconsin, became the John Muir Memorial Park, in honor of the Wisconsin native who, after leaving the family farm nearby, was to play an important part in the establishment of our National Park system. The park has been made possible through the concerted efforts and generosity of Wisconsin citizens, and includes sports and recreation areas, picnic grounds, and a boat landing on the lake shore, as well as a botanical sanctuary. Muir was a native of Scotland, and a graduate of the University of Wisconsin. Plans for the park dedicated to him were prepared by Robert Stigani, University landscape horticulturalist, and Professor William Longenecker, also of the University of Wisconsin. Among volunteers preparing the land for a park were students from Westfield, Oxford and Montello high schools.

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Nature AND THE MICROSCOPE

By JULIAN D. CORRINGTON

Science Shops-10

Ward's Natural Science Establishment-4

IN ITS golden days Ward's was practically a monopoly. Not often were there competing firms, and such few as attempted to enter this specialized field usually lasted only a short time. On June 1, 1881, appeared the first issue of *Ward's Natural Science Bulletin*, possibly the first—certainly one of the first—house organs in America. Its purpose was "to notice such points in Natural Science as are brought up by the transactions of the Establishment, which from the conditions of the case will be found to include something of nature generally, with a world wide comprehensiveness." Edited by Frederick Lucas and others, the *Bulletin* was issued sporadically for six years, and then lapsed for forty-five years before its modern revival in 1932 under the editorship of the present writer. The old copies make fascinating reading today, with their formal accounts of journeys, taxidermic methods, letters and personal items, illustrated with wood cuts.

A second fire, which partially destroyed the second Cosmos Hall in 1891 was a serious but temporary setback, the chief single loss being the mounted mastodon intended for the Chicago Fair.

Also in 1891 occurred a shakeup that was fully as drastic for the Professor's fortunes as was the fire. For now came incorporation and the issuance of shares of stock, with government vested in a board of directors made up principally of members of the Ward family, Hiram Sibley, and James S. Watson. The stock was bought up by employees, former employees, and Rochester citizens, but the majority of these shares were eventually cornered by Frank A. Ward at a low price. By the agreement of incorporation, Professor Ward gave the Establishment exclusive use of his name and guaranteed not to engage in a like business. Roswell Ward reports that "in the entire life of this initial incorpora-

tion it did not pay a dividend or issue a financial statement." In fact, the Establishment was destined to continue in this remarkably moribund state of finance for the first 81 years of its life, or until 1943.

Competition

There was, however, another firm in Rochester by the same name, and at times it was a thorn in the flesh. Charles Howell Ward, eldest son of Henry A., founded the Anatomical Laboratory of Charles H. Ward in 1889 and for fifty years carried on the development of improved preparations illustrating human and comparative osteology and anatomy. Practically all universities and medical schools patronized "Charley" Ward, as his regular customers came to know him. A big, bluff fellow, with nicotine-stained moustache, keen wit and shrewd eye, he was a superb artisan with such subjects as a human skeleton painted to show all muscle attachments, or a dissection of the human skull to show the auditory ossicles *in situ*. This inevitably drained some business contracts away from the Establishment. A younger son, Henry Levi Ward, worked for his father a number of years, making trips for the organization, but later became Director of the Milwaukee Public Museum, transforming it into a noted center for general education in the natural sciences.

These men had, therefore, no connection with the further history of the Establishment. Frank A. Ward, first cousin of the founder, had received little training in the natural sciences beyond what he had garnered from Prof. McCloskey's courses at Princeton, where he graduated in 1870. But his continual association with specimens at the Establishment in time gave him a comprehensive knowledge of the whole field, and by 1884 he was appointed treasurer and, at the turn of the century, after Henry A. Ward had given up active interest in the firm, became its president. He died in 1926. Meanwhile his sons had joined the company; Edward S. and Frank Hawley

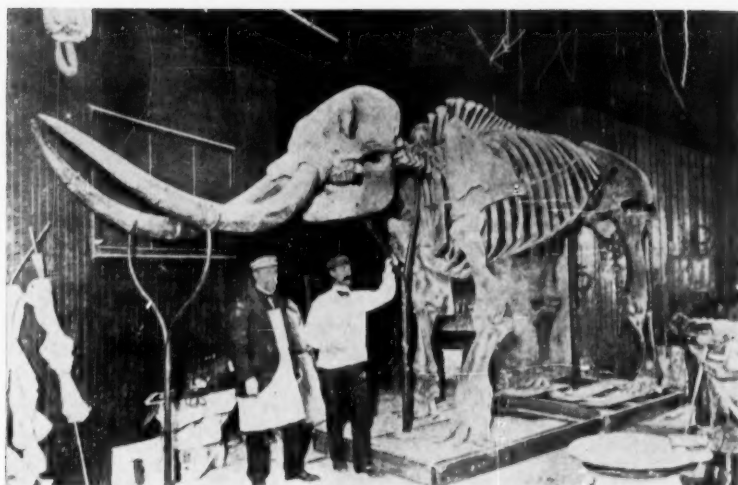
in 1906, George Merritt in 1918, upon return from the first world war. Personal disaster took a heavy toll of the Ward family in these years. As we have noted, the Professor was killed by an automobile in Buffalo in 1906, and now it was Edward who died in a railroad accident in 1913, and then George Merritt Ward in an automobile crash in 1927. This left Frank Hawley Ward as the sole surviving member of the family who had any connection at all with the Establishment.

Into a decline

The corporation went into a slow but steady decline during the first third of the twentieth century. Partly this was due to the absence of the Professor's tremendous drive and his promotional enthusiasm and skill; partly because museums had now assembled their own staffs and built up their own technical knowledge and had now become in large measure independent of Ward's; and partly because there was none of the huckster in the Ward blood, and they continued to be notoriously bad business men.

Hawley Ward felt his responsibilities keenly. Should anything happen to him, it was extremely probable that the Establishment would not have continued at all, and this contingency was an unthinkable one. And so the Ward family approached the University of Rochester with the proposition of turning over the ownership of the entire and immense stock of specimens to the University as the Frank A. Ward Foundation of Natural Science. As readers of this series will recall, the University and the Establishment had never been able to see eye to eye, and so this was a capital error from the beginning—but it was a case of any port in a storm. The plan was eagerly espoused by Professor Fairchild (Geology), Professor Dodge (Biology) and William B. Hale.

Herman LeRoy Fairchild, a graduate of Cornell, had come to Rochester as a young man during the late eighties, attracted chiefly by the presence of the famous Ward cabinet. This great collection had been placed in the upper floor of Sibley Hall, the combined museum and library building, by the librarian, Frank Phinney, a cousin of the writer's. He could see no virtue in such bric-a-brac; to him the whole building should have been library, period. Needless to state, the Ward cabinet was in a



Messrs. Kirchhoff and Burgie, famous technical experts of a bygone day at Ward's, stand by the mounting of a mastodon that they had completed in skeleton for shipment to Roumania.

fearful state of disorder. Fairchild proceeded to reorganize the exhibits and make them into attractive and useful displays, but again, after his retirement, they were dismantled and stored.

Now it became the plan of the Fairchild-Dodge-Hale group that the staff of Ward's could once more rehabilitate the collection, add to it, and maintain it. There was to be a great new building for the Establishment containing a fine museum of natural history. Students would be trained in methods and graduate students would find here endless opportunities for research.

It can be argued of course, as many did, that the business of a University is education and that it has no warrant to engage in the commercial sale of supplies, even though these may be educational in nature. When Ward's was taken over, neither the administration nor the faculty of the University formulated any plan for utilization of the considerable pool of knowledge and skill of the sizeable staff at the Establishment, which they came to regard as more or less of a white elephant. No building was provided; no funds were set up. Ward's was expected to build a museum, train students, and implement the proposed plan, but stand on its own feet financially through commercial sales. It was indeed fantastic to expect that a concern with such a long history of financial ineptitude should suddenly take on the added responsibility of building a big museum with no monetary support from the University, and this attitude alone doomed

the whole arrangement from the start.

If this were not enough, the pro-Ward group now ran into an active counter movement. Fairchild, Dodge and Hale wanted a museum of actual specimens, but Dr. Harold Alling, who had succeeded Fairchild as head of the geology department thought that a more modern approach of miniature exhibits and dioramas was preferable, and inasmuch as his father was chairman of the board of the University, it was but to be expected that this view should prevail. We are not here concerned with the relative merits of these two policies, but needless to say the Establishment found no place in the Alling scheme.

Even worse was to come. How the old Establishment somehow managed to muddle through to its present estate of a successful and modern firm will be told in future installments.

Twentieth Anniversary

This Department was inaugurated with the issue of August, 1937 and, accordingly, the present installment marks twenty years under the microscope. During this period we have featured 200 main articles and a vast number of minor items, as well as 459 book reviews. Among subdepartments there have been 43 entries of *Historical Outline*, discontinued recently but soon to be resumed, 46 of the *Beginner's Primer* series, 15 *Apple Polishers*, designed as hints to teachers, 52 technique tips, and condensed versions of the histories of Bausch & Lomb, Spencer

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Lens Company (now American Optical Company), Testa, Watson's, and Leitz, with others to follow. Among commercial firms of decided importance to microscopists, we have printed historical sketches under the caption of *Science Shops*, of the Carolina Biological Supply Company, Eimer and Amend—Fisher Scientific Company, Villa Alba Laboratory, Flatters & Garnett, Quivira, and at present are concluding a longer series on Ward's Natural Science Establishment, which has had a more colorful history than is generally the case with supply firms. *Family Album* has provided information on optical instruments other than the ordinary laboratory microscope. There have been *Optical Tricks* and a series on *Meteorological Optics*, followed up by *Optical Illusions*. The humor department has not been neglected, with a large assortment of songs, poems, jokes, cartoons, *Postmortem Quotes* and others. Such developments as electron and phase-contrast microscopy and reflecting objectives have been explained.

Our twenty-year span has seen the rise and fall of the American Society of Amateur Microscopists, with its publication *The Bulletin*, which seemed to fulfill the need for organization on the part of its members and provide an outlet for printing their many original contributions. It did not survive the Second World War. We have developed a large correspondence of worldwide spread and have made countless friends. And

so we look forward to a third decade with great interest and continuing enthusiasm for a hobby that has no limits and which provides a boundless source of subject matter for a legion of science-minded devotees.

It is fitting that our new book, *Exploring With Your Microscope*, happens to be issued by the McGraw-Hill Book Company just at this time.

We understand that it is reviewed for our readers by Editor Westwood elsewhere in this issue.

Book Review

THE fourth edition of *Human Anatomy and Physiology*, by Millard, King, and Showers, maintains the high standard of earlier issues and

incorporates recent findings throughout. Among the more significant changes are: the nervous system has been brought forward to the position of unit two, following treatment of the body as a whole, thus utilizing the knowledge of an integrating mechanism in the discussions of other systems that follow; additional introductory material precedes each system; where new concepts are introduced, discussions of earlier views have been deleted in the interest of conserving space; twelve new drawings appear and others have been clarified.

The illustrations, 225 of which are the work of Lucille Cassell Innes, form a most important part of any book of this nature, and are especially to be commended. The writing is clear and factual, but in a style that does not become monotonous, a difficult feat in descriptive anatomy. This work remains our favorite text in this subject for all persons, in and out of class, who do not require the exhaustive medical-school presentation. It should be in the library of all high schools and colleges, and is written specifically for undergraduate courses at the college level and for schools of nursing. It is the best text for the layman and for professionals reviewing for examinations.


Pp. xi, 593; figs. 315, 55 in color. W. B. Saunders Co., West Washington Sq., Philadelphia 5, 1956. \$5.00.

B & L Memorial

Bausch & Lomb's Early Settlers, the organization of employees of 25 or more years of service, recently installed a handsome 32-foot blue spruce in Lomb Park, in front of the main plant in Rochester. A plaque states that the tree memorializes Joseph F. "Tom" Taylor, past chairman of the board of directors, who died June 13, 1956. Each Christmas the big tree is to be strung with lights and decorated to serve as the Company tannenbaum, truly a useful and growing reminder of a beloved friend. Thus it happened by chance that two managers of the world's leading optical companies, Ernst Leitz and Tom Taylor, died in the same month.

Dr. Corrington's new book, a fine addition to the microscope library, is reviewed on page 342 of this issue.

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